OAK CREEK WATER AND SEWER UTILITY
MILWAUKEE COUNTY, WISCONSIN

SPECIFICATIONS FOR

Project Nos. 08101 & 08102
PUETZ ROAD BOOSTER STATION
PART A – Booster Station Construction
PART B – Transmission Main Construction

August 2009

8/13/09

Robert E. Lee & Associates, Inc.
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See RELs website for project bid lists (updated 3pm daily) as well as other project information.

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BIDDING AND CONTRACT REQUIREMENTS

NOTICE TO BIDDERS

OWNER — The Oak Creek Water & Sewer Utility hereby gives notice that sealed proposals will be received in the Utility's office at 170 W. Drexel Avenue, Oak Creek, Wisconsin, 53154.

PROJECT — The work, officially known as Project No. 08101, PUETZ ROAD BOOSTER STATION, PART A BOOSTER STATION CONSTRUCTION AND PART B TRANSMISSION MAIN CONSTRUCTION, consists of constructing the following approximate quantities:

ITEM DESCRIPTION	QUANTITY
20-inch diameter ductile iron water main, thickness Class 50, including all required tees, connections to existing mains and all required restoration	510 LF
24-inch diameter ductile iron water main, thickness Class 50, including all required connections to existing mains and all required restoration	270 LF
20-inch diameter butterfly valve and value box and all required restoration	2 Each
24-inch diameter butterfly valve and valve box, and all required restoration	3 Each
4-inch diameter, Schedule 40 sanitary sewer lateral, including all fittings, cleanouts, and connections	120 LF
16-inch valve	1 Each
6-inch valve	1 Each
Hydrant	1 Each
Hydrant lead	1 Each
Booster Station	1 LS
Provide an add/deduct for the following: All iron, steel and manufactured goods incorporated in the project shall be produced as per requirements in specification section American Recovery and Reinvestment Act (ARRA) "Federal Stimulus Package" special requirements.	Add/Deduct Lump Sum
Provide an add/deduct for complying with Davis Bacon wage rates.	Add/Deduct Lump Sum

TIME

Proposals must be received by the office of the Utility, 170 W. Drexel Avenue, no later than 10:00 a.m., Friday September 25, 2009, at which time and place the proposals will be publicly opened and read aloud.

CONTRACT DOCUMENTS

Plans, specifications, and bidding documents may be obtained at the Utility office 170 W. Drexel Avenue, Oak Creek, WI 53154. A non-refundable fee of $75.00 will be required for each set of Bidding Documents payable to the Oak Creek Water and Sewer Utility. Mail requests for Bidding Documents shall require an additional amount of $10.00 to cover the costs of postage and handling. Monies for the bidding documents and postage and handling are not refundable. These documents are also available for download free at the Utility's web site: www.water.oak-creek.wi.us under the public contracts section.

STATUTORY PROVISIONS

The Contract letting shall be subject to the provisions of Section 62.15, 66.0901, 66.0903, and 779.16 Wisconsin Statutes. The minimum wage scale to be paid on this project shall be in accordance with the prevailing minimum wage as determined by federal or state law, whichever applies, and such wage is incorporated by reference, as it may be amended from time to time. If the United States Department of Housing and Urban Development or State of Wisconsin, Department of Workforce Development has issued a wage rate determination, then it shall apply.

Note: This project may be funded under the American Recovery and Reinvestment Act (ARRA) "Federal Stimulus Package" and the Wisconsin Safe Drinking Water program.

Any contract or contracts awarded under this invitation for bids must demonstrate positive efforts to utilize Small Business Enterprises (SBE), Women Business Enterprises (WBE), and Minority Business Enterprises (MBE). All bidders must submit completed SBE, WBE, and MBE forms with their bids. Failure to complete these forms may result in rejection of a bid. This procurement will be subject to regulations contained in the Federal and Wisconsin Administrative Code. Failure to comply could result in the termination of funding.

This procurement is subject to the Grantee's policy regarding the increased use of small, minority, and women's businesses. The Grantee's policy requires all bidders to undertake specified affirmative efforts at least fifteen (15) days prior to bid opening. The policy as well as the cited regulations are contained in the specifications.

Minimum salaries and fringes to be paid on the project shall be in accordance with the prevailing wage rate scale established by the Federal Department of Labor (DOL). Attention is called to the facet that not less than the minimum salaries and fringes set forth in the Contract Documents must be paid on this project, and that the Contractor must ensure that employees and applications for employment are not discriminated against because of their race, color, religion, sex, national origin, or other protected class. Federal Labor standards program laws, including, but not limited to the Davis Bacon Act, the Copeland Anti Kickback Act, and the Contract Work Hours and Safety Standards Act will apply to all projects.

The bidder's attention is directed to the Federal forms contained in the contract documents which describe, in detail, the Federal requirements regarding Labor Standards, Equal Employment Opportunity, need for Affirmative Action, etc.

Attention of bidders is particularly called to the requirements as to conditions of employment to be observed and minimum wage rates to be paid under the contract, Section 3, Segregated Facility, Section 109 and E.O. 11246.

Section 109 of the Housing and Community Development Act of 1974. No person shall, on the grounds of race, color, national origin, or sex be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity funded in whole or in part with funds made available under this title.

Section 3 of the Housing and Urban Development Act of 1968, as amended, which provides that to the greatest extent feasible, opportunities for training and employment shall be given to lower-income residents of the project area, and that contracts, in connection with the project, be awarded to business concerns located in, or owned in substantial part, by residents of the project area.

Title VI of the Civil Rights Act of 1964 (P.L. 88-352), which provides that no person shall on the grounds of race, color, or national origin be excluded from participation in, be denied the benefits of, or be subjected to discrimination, under any program or activity receiving federal financial assistance.

Federal Water Pollution Contract Act Amendments of 1972,

Section 13, which provides that no person shall on the basis of sex be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any educational program or activity receiving federal financial assistance under this Act.

Title IX of the Education Amendments of 1972, which provides that no person shall on the basis of sex be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any educational program or activity receiving federal financial assistance.

Age Discrimination of 1975 (P.L. 94-135), which prohibits, with certain exceptions, discrimination on the basis of age in programs or activities receiving federal financial assistance.

Section 504 of the Rehabilitation Act of 1973 (including Executive Orders 11914 and 11250), which provides that no otherwise qualified handicapped individual shall solely by reason of his or her handicap, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance.

Equal Employment Opportunity Requirements, Executive Order 11246, which requires that a contractor under a federal or federally assisted construction project not discriminate in employment on the basis of race, color, religion, sex, or national origin. The Order requires contractors to take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Further, it requires the contractor to post all mandatory equal opportunity notices and complete all required Department of Labor and Equal Opportunity Commission reporting forms.

Uniform Relocation Assistance and Real Property Acquisitions Act of 1989 (49 CFR Part 24), which provides for fair and equitable treatment of persons displaced or whose property is acquired as a result of federal and federally assisted programs.

Debarment and Suspension Requirements, Executive Order, 40 CFR Part 32, which requires recipients, contractors, and subcontractors, to provide certifications that they will not knowingly enter into contracts with individuals or businesses which have been debarred or suspended from federal assistance programs.

Women's and Minority Business Enterprise, Executive Orders

11625 and 12138 and 40 CFR 35.3145(d) and (e), which establishes requirements and procedures for the utilization and reporting of minority and women owned (MBE/WBE) business participation in for federally funded projects.

Section 306 of the Clean Air Act and Section 508 of the Clean Water Act, including Executive Order 11738, Administration of the Clean Air Act and Federal Water Pollution Control Act with Respect to Federal Contracts, Grants, or Loans, which prohibits the recipient from entering into contracts or otherwise extending federal assistance to persons or facilities listed in the Environmental Protection Agency's list of Violating Facilities.

As part of the procedure for determining the ability of contractors to comply with the equal opportunity clause, "prospective bidders" may be requested to attend a meeting prior to the opening of bids where they will be instructed in the equal employment opportunity requirements of the federal and state agencies.

A pre-bid meeting will not be held.

BID GUARANTEE

A certified check or bank draft payable to the Oak Creek Water & Sewer Utility, or a satisfactory bid bond, in an amount not less than 5% of the bid shall accompany each bid as a guarantee that if the bid is accepted, the bidder will execute and file the proposed contract and bond within 10 days after the award of the contract. In case the bidder fails to file such contract and bond within the time set by the Utility, the check or bid bond shall be forfeited to the Utility as liquidated damages pursuant to SS.62.15(3).

EQUAL OPPORTUNITY

The Oak Creek Water & Sewer Utility hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, minority business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the ground of race, color, sex, or national origin in consideration for an award.

BID REJECTION

The Oak Creek Water & Sewer Utility Commission reserves the right to reject any and all bids, waive any informalities in bidding, or to accept the bid or bids, which best serves the interest of the Utility.

BID WITHDRAWAL

No bid shall be withdrawn for a period of 30 days after the scheduled opening of the bids without the consent of the Oak Creek Water & Sewer Utility Commission.

BIDDING DOCUMENTS AVAILABILITY	Plans, specifications, and bidding documents shall be available on September 3, 2009.

SECTION 00200
INSTRUCTIONS TO BIDDERS

ARTICLE 1 - DEFINED TERMS

1.01 Terms used in these Instructions to Bidders will have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof:

A. Bidder--The individual or entity who submits a Bid directly to OWNER.

B. Issuing Office--The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.

C. Successful Bidder--The lowest responsible Bidder submitting a responsive Bid to whom OWNER (on the basis of OWNER's evaluation as hereinafter provided) makes an award.

ARTICLE 2 - COPIES OF BIDDING DOCUMENTS

2.01 Complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the Advertisement or Invitation to Bid may be obtained from the Issuing Office.

2.02 Complete sets of Bidding Documents must be used in preparing Bids; neither OWNER nor ENGINEER assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.03 OWNER and ENGINEER in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids for the Work and do not confer a license or grant for any other use.

ARTICLE 3 - QUALIFICATIONS OF BIDDERS

Not Applicable.

ARTICLE 4 - EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

4.01 Subsurface and Physical Conditions

A. The Supplementary Conditions may identify:

1. Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Bidding Documents.

2. Those drawings of physical conditions in or relating to existing surface and subsurface structures at or contiguous to the Site (except Underground Facilities) that ENGINEER has used in preparing the Bidding Documents.

B. Copies of reports and drawings referenced in paragraph 4.01.A, if any, will be made available by OWNER to any Bidder on request. Those reports and drawings are not part of the Contract

Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in paragraph 4.02 of the General Conditions has been identified and established in paragraph 4.02 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions or information contained in such reports or shown or indicated in such drawings.

4.02 Underground Facilities

A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to OWNER and ENGINEER by owners of such Underground Facilities, including OWNER, or others.

4.03 Hazardous Environmental Condition

A. The Supplementary Conditions identify those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that ENGINEER has used in preparing the Bidding Documents.

B. Copies of reports and drawings referenced in paragraph 4.03.A will be made available by OWNER to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in paragraph 4.06 of the General Conditions has been identified and established in paragraph 4.06 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

4.04 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated conditions appear in paragraphs 4.02, 4.03, and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work appear in paragraph 4.06 of the General Conditions.

4.05 On request, OWNER will provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

4.06 Reference is made to Article 7 of the Supplementary Conditions for the identification of the general nature of other work that is to be performed at the Site by OWNER or others (such as utilities and other prime contractors) that relates to the Work for which a Bid is to be submitted. On request, OWNER will provide to each Bidder for examination access to or copies of Contract Documents (other than portions thereof related to price) for such other work.

4.07 It is the responsibility of each Bidder before submitting a Bid to:

A. examine and carefully study the Bidding Documents, including any Addenda and the other related data identified in the Bidding Documents;

B. visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;

C. become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, or performance of the Work;

D. carefully study all reports of explorations and tests of subsurface conditions, if any, at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures, if any, at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions, and carefully study all reports and drawings of a Hazardous Environmental Condition, if any, at the Site which have been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions;

E. obtain and carefully study (or assume responsibility for doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto;

F. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times and in accordance with the other terms and conditions of the Bidding Documents;

G. become aware of the general nature of the work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Bidding Documents;

H. correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;

I. promptly give ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by ENGINEER is acceptable to Bidder; and

J. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

4.08 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and

the written resolutions thereof by ENGINEER are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

ARTICLE 5 - PRE-BID CONFERENCE

5.01 A pre-bid conference will not be held. All bidders are encouraged to visit the site to become acquainted with site conditions.

ARTICLE 6 - SITE AND OTHER AREAS

6.01 The Site is identified in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by OWNER unless otherwise provided in the Bidding Documents.

ARTICLE 7 - INTERPRETATIONS AND ADDENDA

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to ENGINEER in writing. Interpretations or clarifications considered necessary by ENGINEER in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by ENGINEER as having received the Bidding Documents. Questions received less than ten days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

Direct all questions to the project contact, Dale Marsh, P.E., or Kimberly Kimmes at the office of the engineer at 920-662-9641. Questions may also be e-mailed to Kimberly Kimmes at kkimmes@releeinc.com.

7.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by OWNER or ENGINEER.

ARTICLE 8 - BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to OWNER in an amount of 5% of Bidder's maximum Bid price and in the form of a certified or bank check or a Bid Bond [on the form attached] issued by a surety meeting the requirements of paragraphs 5.01 and 5.02 of the General Conditions.

8.02 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, OWNER may annul the Notice of Award and the Bid security of that Bidder will be forfeited. The Bid security of other Bidders whom OWNER believes to have a reasonable chance of receiving the award may be retained by OWNER until the earlier of seven days after the Effective Date of the Agreement or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.

8.03 Bid security of other Bidders whom OWNER believes do not have a reasonable chance of receiving the award will be returned within seven days after the Bid opening.

ARTICLE 9 - CONTRACT TIMES

9.01 The number of days within which, or the dates by which, the Work is to be (a) Substantially Completed and (b) also completed and ready for final payment are set forth in Section 00520, Agreement.

ARTICLE 10 - LIQUIDATED DAMAGES

10.01 Provisions for liquidated damages, if any, are set forth in the Agreement.

ARTICLE 11 - SUBSTITUTE AND "OR-EQUAL" ITEMS

11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, or "or-equal" materials and equipment as defined in paragraph 6.05 of the General Conditions, or those substitute materials and equipment approved by the Engineer and identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of required type, function and quality to be met by any proposed substitute or "or-equal" item. Request for Engineer's clarification of material sand equipment considered "or-equal" prior to the Effective Date of the Agreement must be received by the Engineer at least 4 days prior to the date for receipt of bids. No item of material or equipment will be considered by Engineer as a substitute unless written request for approval has been submitted by Bidder and has been received by Engineer at least 15 days prior to the date for receipt of Bids. Each request shall conform to the requirements of paragraph 6.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon the Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any proposed substitute item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.

ARTICLE 12 - SUBCONTRACTORS, SUPPLIERS, AND OTHERS

12.01 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to OWNER in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to OWNER a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by OWNER. If OWNER or ENGINEER, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, OWNER may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute, in which case apparent Successful Bidder shall submit an acceptable substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and OWNER may consider such price adjustment in evaluating Bids and making the contract award.

12.02 If apparent Successful Bidder declines to make any such substitution, OWNER may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which

OWNER or ENGINEER makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to OWNER and ENGINEER subject to revocation of such acceptance after the Effective Date of the Agreement as provided in paragraph 6.06 of the General Conditions.

12.03 CONTRACTOR shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom CONTRACTOR has reasonable objection.

12.04 The Contractor shall not award work to Subcontractor(s) in excess of the limits stated in SC 6.06.

ARTICLE 13 - PREPARATION OF BID

13.01 The Bid form is included with the Bidding Documents. Additional copies may be obtained from the office of the City of Oak Creek.

13.02 All blanks on the Bid form shall be completed by printing in ink or by typewriter and the Bid signed. A Bid price shall be indicated for each [section, Bid item, alternative, adjustment unit price item, and unit price item] listed therein, or the words "No Bid," "No Change," or "Not Applicable" entered.

13.03 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.

13.04 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be shown below the signature.

13.05 A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown below the signature.

13.06 A Bid by an individual shall show the Bidder's name and official address.

13.07 A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid form. The official address of the joint venture must be shown below the signature.

13.08 All names shall be typed or printed in ink below the signatures.

13.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid form.

13.10 The address and telephone number for communications regarding the Bid shall be shown.

13.11 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of the Contract. Bidder's state contractor license number for the state of the Project, if any, shall also be shown on the Bid form.

ARTICLE 14 - BASIS OF BID; EVALUATION OF BIDS

14.01 Lump Sum

Part A – Booster Station Construction (Lump Sum with supplemental bid items)

A. Bidders shall submit a Bid on a lump sum basis for the base Bid and include a separate price for each supplemental and alternate bid item described in the Bidding Documents as provided for in Section 00410, Bid Form. The price for each supplemental and alternate bid item will be the amount [added to] [or] [deleted from] the base Bid if OWNER selects the alternate.

14.02 Unit Price

Part B – Transmission Main Construction (Unit Price with supplemental bid items)

A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in Section 00410, Bid Form.

B. The total of all estimated prices will be determined as the sum of the products of the estimated quantity of each item and the unit price Bid for the item. The final quantities and Contract Price will be determined in accordance with paragraph 11.03 of the General Conditions.

C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

14.03 The Bid price shall include such amounts as the Bidder deems proper for overhead and profit on account of cash allowances, if any, named in the Contract Documents as provided in paragraph 11.02 of the General Conditions.

14.04 Supplemental and Alternate Bid Items

A. The bidder shall provide a price for all alternate bid items included in the Bid Form for the Owner's consideration. The alternate bid items to be performed shall be selected by the Owner. Only those alternate bid items selected by the Owner will be used to determine the low bidder. Failure to provide a price for the alternate bid items may render the bid unresponsive to the request for bids and may serve as the basis for rejection of the bid.

ARTICLE 15 - SUBMITTAL OF BID

15.01 With each copy of the Bidding Documents, a Bidder is furnished one separate unbound copy of the Bid Form, and the Bid bond form. The unbound copy of the Bid Form is to be completed and submitted with all the attachments outlined in Article 7 of the Bid Form

15.02 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the advertisement or invitation to Bid and shall be enclosed in an opaque sealed envelope plainly marked with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in

a separate envelope plainly marked on the outside with the notation "BID ENCLOSED." When using the mail or other delivery system, the Bidder is totally responsible for the mail or other delivery system delivering the Bid at the place and prior to the time indicated in the Advertisement for Bid. A mailed Bid shall be addressed to OWNER at address indicated on Bid Form.

ARTICLE 16 - MODIFICATION AND WITHDRAWAL OF BID

16.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.

16.02 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with OWNER and promptly thereafter demonstrates to the reasonable satisfaction of OWNER that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 17 - OPENING OF BIDS

17.01 Bids will be opened at the time and place indicated in the advertisement or invitation to Bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 18 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE

18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid form, but OWNER may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 19 - AWARD OF CONTRACT

19.01 OWNER reserves the right to reject any or all Bids, including without limitation, nonconforming, non-responsive, unbalanced, or conditional Bids. OWNER further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to be non-responsible. OWNER also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

19.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

19.03 In evaluating Bids, OWNER will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.

19.04 In evaluating Bidders, OWNER will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.

19.05 OWNER may conduct such investigations as OWNER deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities to perform the Work in accordance with the Contract Documents.

19.06 If the Contract is to be awarded, OWNER will award the Contract to the responsible Bidder whose Bid, conforming with all the material terms and conditions of the Instructions to Bidders, is lowest, price and other factors considered.

ARTICLE 20 - CONTRACT SECURITY AND INSURANCE

20.01 Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth OWNER's requirements as to performance and payment Bonds and insurance. When the Successful Bidder delivers the executed Agreement to OWNER, it must be accompanied by such Bonds.

ARTICLE 21 - SIGNING OF AGREEMENT

21.01 When OWNER gives a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement with the other Contract Documents which are identified in the Agreement as attached thereto. Within 15 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to OWNER. Within ten days thereafter, OWNER shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

ARTICLE 22 – REQUIREMENTS FOR FEDERALLY FUNDED PROJECTS

Bidders on this work shall be required to comply with the Federal Requirements regarding Labor Standards, Equal Employment Opportunity, need for Affirmative Action, etc.

The following attachments are provided to clarify Federal requirements concerning employment opportunity and various labor standards. It is necessary that each bidder be thoroughly familiar with the information and requirements covered in these attachments.

Attachment 4-A	-	Equal Opportunity Clause for Contracts/Subcontracts above $10,000 (E.O. 11246)
Attachment 4-B	-	Lobbying Certification For Contracts, Grants, Loans, And Cooperative Agreements
Attachment 4-C	-	Section 3 Contract Language Requirements
Attachment 4-D	-	Affirmative Action Requirements (E.O. 11246)
Attachment 4-F	-	Federal Equal Employment Opportunity Construction Contract Specifications (E.O. 11246)
Attachment 4-14	-	Subcontractor Eligibility
Attachment 5-I	-	Federal Labor Standards Provisions (4010)
Attachment 5-L	-	Preconstruction Checklist for Contractors
Bidder's Certification	-	Bidders Certification of Compliance with the Buy American Provisions Contained in Section 1605 of ARRA

22.02 **Davis-Bacon Wage Rates** – Davis-Bacon wages shall be required as an Alternate Bid to this project under the "Federal Stimulus Package / American Recovery & Reinvestment Act of 2009'.

A. Davis Bacon Wage Rate Requirements

1. Notwithstanding any other provision of law and in a manner consistent with other provisions in this ACT, all laborers and mechanics employed by contractors and subcontractors on projects funded directly by or assisted in whole or in part by and through the Federal Government pursuant to this Act shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality as determined by the Secretary of Labor in accordance with subchapter IV of chapter 31 of title 40, United States Code. With respect to the labor standards specified in this section, the Secretary of Labor shall have the authority and functions set forth in Reorganization Plan Number 14 of 1950 (64 State. 1267; 5 U.S.C. App.) and section 3145 of title 40, United States Code.

B. The CONTRACTOR shall comply with 29 CFR 5.5(a).

22.03 **Buy American Requirements** – 'Buy American' requirements shall be required as an Alternate Bid to this project under the 'Federal Stimulus Package/American Recovery & Reinvestment Act of 2009'.

A. Buy American

1. USE OF AMERICAN IRON, STEEL, AND MANUFACTURED GOODS.

a. None of the funds appropriated or otherwise made available by this Act may be used for a project for the construction, alteration, maintenance, or repair of a public building or public work unless all of the iron, steel, and manufactured goods used in the project are produced in the United States.

b. Subsection a., shall not apply in any case or category of cases in which the head of the Federal department or agency involved find that –

1) Applying subsection a., would be inconsistent with the public interest;
2) Iron, steel, and the relevant manufactured goods are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or
3) Inclusion of iron, steel, and manufactured goods produced in the United States will increase the cost of the overall project by more than 25 percent.

c. If the head of a Federal Department or Agency determines that it is necessary to waive the application of subsection a., based on a finding under subsection b., the head of the Department or Agency shall publish in the Federal Register a detailed written justification as to why the provisions is being waived.

d. This section shall be applied in a manner consistent with United States obligations under international agreements.

ARTICLE 23 – REQUIREMENTS FOR WISCONSIN SAFE DRINKING WATER AND CLEAN WATER FUND

23.01 Any contract or contracts awarded under this Advertisement for Bids are expected to be funded in part by a grant/loan from the Safe Drinking Water Fund and Wisconsin Clean Water Fund. This procurement shall be subject to regulations contained in NR.162 and NR.166, Wisconsin Administrative Code and appropriate state statutes.

23.02 Any contract or contracts awarded under this Advertisement for Bids must demonstrate good faith efforts to utilize Minority-Owned and Woman-Owned and Small Business in a Rural Area Businesses (MBE / WBE / SBRA). This procurement shall be subject to regulations contained in NR.162 and NR.166. Failure to comply could result in the termination of DNR participation (NR.162 and NR.166). Minority-Owned and Women-Owned Business documentation shall be furnished with the Bid in order for that bid to be considered responsive. Copies of these forms are located at the end of Section 00410. Additional documentation including dollar amount and type of work for each proposed MBE / WBE / SBRA subcontractor will be required of the apparent low bidder prior to award of contract.

NOTE: All subcontracts must be in writing and must contain the Wage Rates and Labor Standards Regulation. Contractual relationships between contractors and alleged subcontractors which are formed for the purpose of evading the application of prevailing wage requirements are expressly prohibited and may provide a basis for debarment. Where there is any doubt as to a bonafide nature of the self-employment subcontractor who has no other employees, the Contractor shall complete Attachment 4-14 (Subcontractor Eligibility).

- END OF SECTION -

ATTACHMENT 4-A: EQUAL OPPORTUNITY CLAUSE (EO 11246)

(FOR GRANTEE PROCUREMENT OF CONSTRUCTION CONTRACTS ABOVE $10,000)

"During the performance of this contract, the contractor agrees as follows:

1. "The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination, rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

2. "The contractor will, in all solicitations or advertisement for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration without regard to race, color, religion, sex or national origin.

3. "The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided by the Contract Compliance Officer advising the said labor union or workers' representatives of the contractor's commitment under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

4. "The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations and relevant orders of the Secretary of Labor.

5 "The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records and accounts by Commerce and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations and others.

6. "In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations or orders, the contract may be canceled, terminated or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965 or by rule, regulation or order of the Secretary of Labor, or as otherwise provided by law.

7. "The contractor will include the provisions of paragraphs 1. through 7. in every subcontract or purchase order unless exempted by rules, regulations or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as Commerce may direct as a means of enforcing such provisions, including sanctions for noncompliance. Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by Commerce, the contractor may request the United States to enter into such litigation to protect the interest of the United States.

   "The grantee further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work. Provided, that if the grantee participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

"The grantee agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

"The grantee further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to take any or all of the following actions: cancel, terminate or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurances of future compliance has been received from such applicant, and refer the case to the Department of Justice for appropriate legal proceedings."

ATTACHMENT 4-B: LOBBYING CERTIFICATION FOR CONTRACTS, GRANTS, LOANS & COOPERATIVE AGREEMENTS

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No federally appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.

2. If any funds other than federally appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this federal contract, grant, loan, or cooperative agreement, the undersigned shall complete Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

3. The undersigned shall require that the language of this CERTIFICATION be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This CERTIFICATION is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this CERTIFICATION is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required CERTIFICATION shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

_____ _____

(Signature of Chief Executive Officer) *(Date)*

_____

(Name of Business/Firm)

ATTACHMENT 4-C: SECTION 3 CONTRACT LANGUAGE REQUIREMENTS

(Applicable to all contracts exceeding $100,000 where the CDBG contract exceeds $200,000.)

Include the following language **in all contracts and subcontracts.**

Section 3 of the Housing and Urban Development Act of 1968. "The work to be performed under this contract is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (Section 3). The purpose of Section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by Section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

"The parties to this contract agree to comply with HUD's regulations in 24 CFR part 135, which implement Section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 135 regulations.

"The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this Section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the Section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

"The contractor agrees to include this Section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this Section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 135.

"The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 135.

"Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.

"With respect to work performed in connection with Section 3 covered Indian housing assistance, Section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U..S.C. 450e) also applies to the work to be performed under this contract. Section 7(b) requires that to the greatest extent feasible: (i) preference and opportunities for training and employment shall be given to Indians; and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-Owned Economic Enterprises. Parties to this contract that are subject to the provisions of Section 3 and Section 7(b) agree to comply with section 3 to maximum extent feasible, but not in derogation of compliance with section 7(b)."

ATTACHMENT 4-D: AFFIRMATIVE ACTION REQUIREMENTS (EO 11246)

(Applicable to construction contracts/subcontracts exceeding $10,000.)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

   Goals for Women = **6.9 percent** (this goal applies nationwide).

   Goals for minority participation = 8.0% (this goal applies county-wide)
   (Insert goals)

   These goals are applicable to all the contractor's construction work (whether or not it is federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographic area located outside of the covered area, it shall apply the goals established for such geographic area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non-federally involved construction.

   The contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3 (a), and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from contractor to contractor or from project to project for the sole purpose of meeting the contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor; employer identification number; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the contract is to be performed.

4 As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is (insert description of the geographical areas where the contract is to be performed giving the state, county and city, if any).

ATTACHMENT 4-F: FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS (EO 11246)

(Applicable to construction contracts/subcontracts exceeding $10,000.)

1. "As used in these specifications:

   a. "Covered area" means the geographical area described in the solicitation from which this contract resulted.

   b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority.

   c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

   d. "Minority" includes:

      i. Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

      ii. Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);

      iii. Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

      iv. American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. "Whenever the contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. "If the contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved Plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. "The contractor shall implement the specific affirmative action standards provided in paragraphs 7.a. through p. of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the contractor should reasonable be able to achieve in each construction trade in which it has employees in the covered areas. Covered construction

contractors performing contracts in geographical areas where they do not have a federal or federally assisted construction contract shall apply the minority and female goals established for the geographic area where the contract is being performed. Goals are published periodically in the Federal Register in notice form and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from federal procurement contracting officers. The contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. "Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. "In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the contractor during the training period, and the contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. "The contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

   a. Ensure and maintain a working environment free of harassment, intimidation and coercion at all sites, and in all facilities at which the contractor's employees are assigned to work. The contractor, where possible, will assign two or more women to each construction project. The contractor shall specifically ensure that all foreman, superintendents and other on-site supervisory personnel are aware of and carry out the contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

   b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

   c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the contractor by the union or, if referred, not employed by the contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the contractor may have taken.

   d. Provide immediate written notification to the Director when the union or unions with which the contractor has a collective bargaining agreement has not referred to the contractor a minority person or woman sent by the contractor, or when the contractor has other information that the union referral process has impeded the contractor's efforts to meet its obligations.

   e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the contractor's employment needs,

especially those programs funded or approved by the Department of Labor. The contractor shall provide notice of these programs to the sources compiled under 7.b. above.

f. Disseminate the contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed and disposition of the subject matter.

h. Disseminate the contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the contractor's EEO policy with other contractors and subcontractors with whom the contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students, and to minority and female recruitment and training organizations serving the contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a contractor's work force.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are non-segregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the contractor's EEO policies and affirmative action obligations.

8. "Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7.a. through p.). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7.a. through p. of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the contractor's minority and female work force participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to document which demonstrates the effectiveness of actions taken on behalf of the contractor. The obligations shall not be a defense for the contractor's noncompliance.

9. "A single goal for minorities and a separate single goal for women have been established. The contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the contractor has achieved its goal for women generally, the contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. "The contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex or national origin.

11. "The contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. "The contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. "The contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7. of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the contractor fails to comply with the requirements of the Executive Order, the implementing regulations or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. "The contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, states (e.g., mechanic, apprentice trainee, helper or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay and locations at which the work was

performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. "Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

ATTACHMENT 4-14: SUBCONTRACTOR ELIGIBILITY

Name of firm_____

Business address_____

Home address_____

Business phone_____

Home phone_____

Social Security number_____

Amount of your subcontract on this project $_____

Sole Proprietor_____ Partnership_____Corporation_____

Describe your work on this project:_____

_____

Who pays for the building materials you use?_____

Is your work "labor only" service?_____

Do you provide your own tools on this project?_____

If not, who does?_____

Are you paid by Lump Sum_____ Amount $_____

By the hour_____ Amount per hour $_____

Piece work_____ How much $_____

Is this your first subcontract?____ If not, list other construction projects you have worked on as a contractor or subcontractor:_____

_____

_____

On this project do you expect to hire or employ anyone else to work for you in completing your work?

_____

On previous projects as a subcontractor have you hired anyone else to work for you?

_____

If this is your first subcontract, for whom did you previously work just prior to your work on this project?

_____

Do you carry liability insurance?_____

Are you employed by any other firm while you are working on this project?_____

Name of firm_

What deductions from the gross amount of your subcontract are made?_____

Federal or state taxes_____ By whom_____

Social Security taxes_____ By whom_____

Other deductions_____ By whom_____

_____
(Signature)

_____
(Title)

_____
(Date)

ATTACHMENT 5-I: FEDERAL LABOR STANDARDS PROVISIONS (4010)

Federal Labor Standards Provisions

U.S. Department of Housing
and Urban Development

Applicability

The project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provision applicable to such Federal assistance.

A. 1. (I) Minimum Wages. All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at the time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or cost reasonable anticipated for bona fide fringe benefits under Section 1(b)(2), of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR-5.5(a)(1)(IV); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification for work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5 (a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR Part 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1 321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefit, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 day of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215-0140.)

(c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any cost reasonably anticipated in providing bona fide fringe benefits under a plan or program. Provided that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

2. Withholding. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work (or under United State Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for an on account of the contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act Contracts.

3. (i) Payrolls and basic records. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name and address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1 (b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the committment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

(ii) (a) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR Part 5.5 (a)(3)(i). This informatiom may submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Document (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, DC. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149.)

(b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be maintained under 29 CFR Part 5.5 (a)(3)(i) and that such information is correct and complete:

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set in 29 CFR Part 3:

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(c) The weekly submission of a property executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph A. 3. (ii)(b) of this section.

(d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph A. 3. (i) of this section available for inspection, copying, or transcription by the authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR Part 5.12.

4 (i) Apprentices and Trainees. Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid

not less than the applicable wage rate on the wage determination for work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act requirement. The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor will insert in any subcontracts the clauses contained in 29 CFR 5.5 (a)(1) through (10) and such other clauses as HUD or its designee may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR Part 5.5.

7. Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, between the U.S. Department of Labor, or the employees or their representatives.

10. (i) Certification of Eligibility. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12 (a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12 (a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1010, Title 18, U.S.C. " Federal Housing Administration Transactions", provides in part: "Whoever, for the purpose of...influencing in any way the action of such Administration...makes, utters or publishes any statement, knowing the same to be false...shall be fined not more than $5000 or imprisoned not more than two years, or both."

11. Complaints, Proceedings, or Testimony by Employees. No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. Contract Work Hours and Safety Standards Act. As used in this paragraph, the terms "Laborers" and "Mechanics" include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of fourty hours in such work week.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchman and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard work week of forty hours without payment of the overtime wages required by the clause set forth in subparagraph (1) of this paragraph.

(3) Withholding for unpaid wages and liquidated damages. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contract, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs (1) through (4) of this paragraph.

C. Health and Safety

(1) No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 (formerly part 1518) and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours an Safety Standards Act (Public Law 91-54, 83 Stat. 96).

(3) The Contractor shall include the provisions of this Article in every subcontract so that such provisions will be binding on each subcontractor. The Contractor shall take such action with respect to any subcontract as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

ATTACHMENT 5-L: PRECONSTRUCTION CHECKLIST FOR CONTRACTORS

MEETING LABOR STANDARDS CONTRACT REQUIREMENTS

INTRODUCTION

The following checklist has been prepared to assist contractors and subcontractors in meeting contractual labor standards responsibilities. All major administrative and procedural activities have been covered in the sequence they will occur as the construction project proceeds. Careful attention to and use of the checklist should result in a minimum number of problems with respect to labor standards.

EXPLANATORY NOTES

The word "employer" as used below refers to the project contractor, each subcontractor, or each lower-tier subcontractor. Payrolls and other documentary evidence of compliance (**marked with asterisk**) are required to be sent to the recipient for review (all to be submitted through the project contractor). The delivery procedure is as follows:

1. Each lower-tier subcontractor, after careful review, submits required documents to the respective subcontractor.

2. Each subcontractor, after checking his own and those of each lower-tier subcontractor he may have, submits required documents to the contractor.

3. The Contractor, after reviewing all payrolls and other documentation, including his own, and correcting violations where necessary, submits all to the recipient.

All employers should check each of the following statements as being true. If any statement is not true, the contractor or his representative should contact the recipient for special guidance.

BEFORE CONSTRUCTION BEGINS EACH EMPLOYER HAS:

1. Not been debarred or otherwise made ineligible to participate in any federal or federally-assisted project. ☐

2. Received appropriate contract provisions covering labor standards requirements. ☐

3. Reviewed and understands all labor standards contract provisions. ☐

4. Received the applicable wage decision as part of the contract. ☐

5. Requested through the recipient and received the minimum wage for each classification to be worked on the project which was not included on the wage rate by the additional classification process and before allowing any such trade(s) to work on the project. ☐

6. Requested and received certification of his apprentice program from the state's Bureau of Apprenticeship and Training (recognized by USBAT) and submitted copy thereof to the recipient prior to employment on the project. Likewise, "trainee" program certification from USBAT, if applicable, must be submitted. ☐

AT CONSTRUCTION START, THE CONTRACTOR HAS:

1. Notified recipient of construction start date in writing. ☐

2. Has placed each of the following on a bulletin board prominently located on the project site which can be seen easily by the workers (and replaced if lost or unreadable any time during construction):

- Applicable Wage decision ❐
- Notice to Employees (WH 1321) ❐

3. Before assigning each project worker to work, has obtained worker's name, best mailing address, and Social Security number (for payroll purposes). ❐

4. Has obtained a copy of each apprentice's certificate with the apprentice's registration number and his year of apprenticeship from the state BAT. ❐

5. Has informed each worker of:

- His/her work classification (journeyman or job title) as it will appear on the payroll and in the wage decision or through the additional classification process. ❐
- His/her duties of work. ❐
- The USDOL Department of Labor's requirement on this project that he/she is either a journeyman, apprentice, or laborer. ❐
  - If journeyman, he/she is to be paid journeyman's minimum wage rate or more; ❐
  - If apprentice, he/she is to be paid not less than the apprentice's rate for the trade based on his/her year of apprenticeship; or ❐
  - If laborer, he/she is to do laborer's work only--not use any tool or tools of the trade--and not perform any part of a journeyman's work--and is to be paid the laborer's minimum wage rate or more. ❐

6. Understands the requirements that each laborer or mechanic who performs work on the project in more than one classification within the same workweek shall be classified and paid at the highest wage rate applicable to any of the work which he/she performs unless the following requirements are met:

- Accurate daily time records shall be maintained. These records must show the time worked in each classification and the rate of pay for each classification, and must be signed by the worker. ❐
- The payroll shall show the hours worked in each classification and the wage rate paid for each classification. ❐
- The payroll shall be signed by the workmen or a signed copy of the daily time record shall be attached thereto. ❐

7. Has informed each worker of his/her hourly wages (not less than the minimum wage rate for his/her work which is Stated in the wage rate).

- Time and one-half for all work over 40 hours in any workweek (see Contract Work Hours Safety Standards Act). ❐
- Fringe benefits, if any (see wage decision for any required). ❐
- Deductions from his/her pay. ❐

8. Has informed each worker that he/she is subject to being interviewed on the job by the recipient or a HUD, USDOL, or other U.S. government inspector, to confirm that his employer is complying with all labor requirements. ❐

9. Has informed each journeyman and each apprentice that a journeyman must be on the job at all times when an apprentice is working and verifying the ratio of journey man to apprentice through the indenture papers. ❐

DURING CONSTRUCTION - EACH EMPLOYER:

1. Has not selected, assigned, paid different pay rates to, transferred, upgraded, demoted, laid off, nor dismissed any project worker because of race, color, religion, sex or national origin. ☐

2. Has employed all registered apprentices referred to him through normal channels up to the applicable ratio of apprentices to journeymen in each trade used by the employer. ☐

3. Will maintain basic employment records accessible to inspection by the recipient or U.S. government representatives. ☐

4. Is complying with all health and safety standards. ☐

5. Has paid all workers weekly. ☐

6. Has submitted weekly payrolls. ☐

A. Prepared on recommended Payroll Form WH-347. ☐

Available from:
Superintendent of Documents
Government Printing Office
Washington, D.C. 20402

Note: Contractors who wish to purchase the forms are urged to submit their orders promptly because the Superintendent of Documents takes six weeks to fill orders. It is permissible for contractors to reproduce the forms if they wish.

Some employers place all project workers on Payroll Form WH-347. The recipient does not review those project workers listed on the payroll who perform work which is descriptive of any of the following job titles which are exempt from labor requirements: project superintendent, project engineer, messenger, clerical workers, timekeepers, bookkeepers, payroll clerks, and Supervisory foreman *(less than 20 percent of time as a working foreman)*.

Any alternate payroll form used should be cleared with HUD before employer starts work on project. A project printout by computer, for example, is acceptable provided all data shown and required on the front and back of Payroll Form WH-347 is on, or included with, payroll submitted to recipient.

B. Front Page of Payroll (Form WH-347)
Heading (6 "blocks" of information)

1. Name of Employer. Name of employer is stated, showing whether contractor or subcontractor. Include IRS I.D. number. ☐

2. Address. Street address or P. O. Box, City, State and Zip Code of Employer is stated. ☐

3. Payroll Number. Each weekly payroll is numbered in sequential order (starting with Payroll NO. "1"). ☐

If employer's workers perform no physical work on the project during workweek, he has submitted a "no work" letter for that workweek. ☐

Payroll of employer's final workweek on the project (completion of his work) is marked "Final." ☐

4. For Week Ending. The last date of the workweek is stated in this "block." ☐

5. Project and Location. Name of project and city in which located is stated. ☐

6. Project or Contract Number. Include the contract number provided by the recipient. ☐

7. Column 1 - Worker's Name, as it appears on his/her pay check, is stated. ☐

Worker's best mailing address and social security number is stated on Payroll No. 1 or the payroll on which his/her name first appears. ☐

If worker changes his/her residential address while working on the project, his/her new address is stated on next applicable payroll. ☐

If any two or more workers have the same name, their social security numbers are included on the payroll to note separate identification. ☐

8. Column 2 - Number of Withholding Exemptions is for employer's convenience--not required by HUD to be completed. ☐

9. Column 3 - The Work Classification (job title) for the worker is included in the Wage rate and denotes the work that worker actually performed. ☐

Note: If the applicable classification is not included in the Wage rate, contractor should call the recipient immediately, and request classification by Additional Classification process.

9a. Apprentice. If worker is an apprentice, his/her State BAT registration number and year of apprenticeship is included in this column the first time the apprentice's name appears on the payroll. ☐

9b. Split Classification. If worker has performed work in more than one class of work during the workweek, such as carpenter and laborer, the division of work will be shown on separate lines of the payroll. ☐

- Accurate daily time records show the exact hours of work performed daily in each class of work, and are signed by the affected workman. ☐
- Each class of work he/she performed is stated in Column 3 in separate "blocks." ☐
- His/her name is repeated in corresponding "blocks" in Column 1. ☐
- The breakdown of hours worked daily under each work classification is stated in Column 4, and total for week in Column 5. ☐
- The applicable wage rate for each classification of work is stated in Column 6. ☐
- The payroll is signed by the workman in the related "blocks" or a signed copy of the daily time records are attached to the payroll. ☐
- If the above is not done, the worker is paid at least the highest minimum wage rate of all of the classes of work performed for all hours worked. ☐

Notes:

Average Pay of Two Classes of Work Not Accepted. The employer shall not pay a "semi-journeyman" or semi-skilled laborer the average of journeyman's and laborer's rates. The actual hours each worker uses tools of trade (journeyman) and each hour he/she does not use tools of the trade (laborer) must be recorded in separate "blocks" in Column 3 of the payroll.

Helper. The work classification of "helper" is not accepted by the Department of Housing and Urban Development, unless included in the Wage rate issued by the Secretary of Labor for the project. Any employee listed as "helper" in absence of such classification in Wage rate must be paid the journeyman's rate for hours he/she uses tools of the trade.

9. Column 4 - Hours Worked, Each Day and Date, for workweek are stated. ☐

Overtime Hours ("O"), if any, are stated separately from straight hours ("S")--over 40 hours in any workweek. ☐

10. Column 5 - Total Hours worked during the workweek are stated (the sum of subcolumns in Column 4)--straight and overtime hours recorded separately. ☐

11. Column 6 - Rate of Pay, not less than the minimum wage for the work classification (see Wage rate) is stated. ☐

The Overtime Rate of Pay is not less than one and one-half times the worker's basic (straight) hourly rate of pay (Contract Work Hours Safety Standards Act). ☐

Apprentices. If a copy of the apprentice's registration certificate from the State BAT has not been submitted to recipient by employer (through contractor) apprentice must be paid journeyman's rate. ☐

Piece Worker. Piece work must be stated in Column 6 at an hourly rate, the gross pay for the workweek (work on the project) divided by the total number of hours worked on the project during the workweek. ❐

12. Column 7 - Gross Amount Earned equals straight hours shown in Column 5 times straight rate of pay shown in Column 6, plus overtime hours (if any) shown in Column 5 times overtime rate of pay shown in Column 6. ❐

13. Column 8 - Deductions. Each deduction made is required by law, or ❐

voluntarily authorized by the worker in writing before the workweek began, or ❐

provided in a bargaining agreement to be deducted from the respective worker's pay. ❐

14. Column 9 - Net Wages stated are Column 7 minus total deductions shown in Column 8. ❐

C. Back of Payroll (Payroll Form WH-347). Each employer has:

1. Completed all blank spaces and understands the penalties for falsification. ❐

2. Checked Item 4 if fringe benefits are included in the Wage rate for any of his/her workers.

4(a) if fringe benefits are paid to approved fund(s), or ❐

4(b) if paid directly to each affected worker-- included in paycheck for the workweek--his paycheck representing at least the pay of the applicable minimum wage rate plus the amount of required fringe benefits. ❐

3. Manually signed the payroll in the "block" marked signature, and stated his/her title. ❐

4. The person who signed the payroll is the employer or an official of the employer who legally is authorized to act for the employer. ❐

D. Weekly Payroll Review. Each employer has promptly:

1. Reviewed the weekly payroll for compliance with all labor requirements (using this check list) and made necessary corrections. ❐

2. Each Lower-Tier Subcontractor has submitted his/her weekly payroll or "no work" letter to the respective subcontractor for the subcontractor to have received within three calendar days from the last date of the workweek. ❐

3. Each subcontractor has received a payroll or "no work" letter from each of his lower-tier subcontractors, reviewed each and his own payroll, required necessary corrections, and submitted all of such payrolls to the contractor to have received within five calendar days from the last date of the workweek. ❐

4. Contractor has received a payroll or "no work" letter from each subcontractor and each lower-tier subcontractor, monitored each including his own payroll, required necessary corrections, and collectively submitted them to the recipient within seven working days of the last date of the respective workweek. ❐

Payrolls and other documentary evidence of compliance are required to be sent to the recipient for review (all to be submitted through the project contractor).

Bidder's Certification of Compliance with the Buy American provisions contained in Section 1605 of ARRA:

1. Identification of American-made Iron, Steel, and Manufactured Goods: Consistent with the terms of the Purchaser's bid solicitation and the provisions of ARRA Section 1605, the Bidder certifies that this bid reflects the Bidder's best, good faith effort to identify domestic sources of iron, steel, and manufactured goods for every component contained in the bid solicitation where such American-made components are available on the schedule and consistent with the deadlines prescribed in or required by the bid solicitation.

2. Verification of U.S. Production: The Bidder certifies that all components contained in the bid solicitation that are American-made have been so identified, and if this bid is accepted, the Bidder agrees that it will provide reasonable, sufficient, and timely verification to the Purchaser of the U.S. production of each component so identified.

3. Documentation Regarding Non- American-made Iron, Steel, or Manufactured Goods: The Bidder certifies that for any component or components that are not American-made and are so identified in this bid, the Bidder has included in or attached to this bid one or both of the following, as applicable:

   a. Identification of and citation to a categorical waiver published by the U.S. Environmental Protection Agency in the Federal Register that is applicable to such component or components, and an analysis that supports its applicability to the component or components;

   b. Verifiable documentation sufficient to the Purchaser, as required in the bid solicitation or otherwise, that the Bidder has sought to secure American-made components but has determined that such components are not available on the schedule and consistent with the deadlines prescribed in the bid solicitation, with assurance adequate for the Bidder under the applicable conditions stated in the bid solicitation or otherwise.

4. Information and Detailed Justification Regarding Non- American-made Iron, Steel, or Manufactured Goods: The Bidder certifies that for any such component or components that are not so available, the Bidder has also provided in or attached to this bid information, including but not limited to the verifiable documentation and a full description of the bidder's efforts to secure any such American-made component or components, that the Bidder believes are sufficient to provide and as far as possible constitute the detailed justification required for a waiver under section 1605 with respect to such component or components. The Bidder further agrees that, if this bid is accepted, it will assist the Purchaser in amending, supplementing, or further supporting such information as required by the Purchaser to request and, as applicable, implement the terms of a waiver with respect to any such component or components.

Print the Name of Authorized Officer			
Signature of Authorized Officer	Date Signed		
Name of Joint Venture, Corporation, Partnership or Sole Proprietorship Submitting Bid			
Street Address or P.O. Box	City	State	Zip Code

Part A

SECTION 00410
BID FORM

PROJECT IDENTIFICATION:

OAK CREEK WATER AND SEWER UTILITY
Puetz Road Booster Station
Part A--Booster Station Construction
Contract No. 4931-09-01

CONTRACT IDENTIFICATION AND NUMBER:

Contract No. 4931-09-01
OAK CREEK WATER AND SEWER UTILITY
Puetz Road Booster Station
Part A--Booster Station Construction

THIS BID IS SUBMITTED TO:

Personal Delivery before Bid Date:
OAK CREEK WATER AND SEWER UTILITY
170 WEST DREXEL AVENUE
OAK CREEK, WI 53154

Mail Delivery before Bid Date:
OAK CREEK WATER AND SEWER UTILITY
170 WEST DREXEL AVENUE
OAK CREEK, WI 53154

1.01 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with OWNER in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

2.01 Bidder accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. The Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of OWNER.

3.01 In submitting this Bid, Bidder represents, as set forth in the Agreement, that:

A. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of all which is hereby acknowledged.

Addendum No.	**Addendum Date**
_____	_____
_____	_____
_____	_____

B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions, and (2) reports and drawings of a Hazardous Environmental Condition, if any, which has been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions.

E. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.

F. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.

G. Bidder is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.

I. Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by ENGINEER is acceptable to Bidder.

J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

4.01 Bidder further represents that this Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any individual or entity to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

Part A – Booster Station Construction (Lump Sum)

_____ (words)

_____(figures)

The alternate bid item will be used to determine the low bidder.

REQUIRED SUPPLEMENTAL BID ITEMS

Item	Description	Unit Price	Total Price
1.	Provide an add/deduct for the following: All iron, steel and manufactured goods incorporated in the project shall be produced as per requirements in specification section American Recovery and Reinvestment Act (ARRA) " Federal Stimulus Package" special requirements.		
	_____ (ADD/DEDUCT LUMP SUM)	$_____	$_____
2.	Provide an add/deduct for complying with Davis Bacon wage rates.		
	_____ (ADD/DEDUCT LUMP SUM)	$_____	$_____

REQUIRED ALTERNATE BID ITEMS

Item	Description	Unit Price	Total Price
1.	1 each of eliminate EG 7310 emergency power generator, for the unit price of:		
	_____ (ADD/DEDUCT UNIT PRICE)	$_____	$_____
2.	4 each of eliminate upper pressure zone (P7213, P7214, P7215, and P7216) pumps as specified in Section 11306, for the unit price of:		
	_____ (ADD/DEDUCT UNIT PRICE)	$_____	$_____

REQUIRED ALTERNATE BID ITEMS (Continued)

Item	Description	Unit Price	Total Price
3.	4 each of 12-inch blind flanges at upper pressure zone pump suction side (typ) as shown on Plan 100-M-03, for the unit price of:		
	_____ (ADD/DEDUCT UNIT PRICE)	$_____	$_____
4.	4 each of eliminate all piping, valves, and accessories between blind flange on discharge and suction piping for the upper pressure zone pumps (P7213, P7214, P7215, and P7216), for the unit price of:		
	_____ (ADD/DEDUCT UNIT PRICE)	$_____	$_____
5.	4 each of 10-inch blind flanges on the 20-inch x 10-inch tee on the upper pressure zone pumps discharge piping (typ), as shown on Plan 100-M-03, for the unit price of:		
	_____ (ADD/DEDUCT UNIT PRICE)	$_____	$_____
6.	4 each of eliminate chlorine residual analyzer (AE7295) for upper pressure zones along with accessories, for the unit price of:		
	_____ (ADD/DEDUCT UNIT PRICE)	$_____	$_____
7.	Contractor shall eliminate the wiring within the conduit for the upper pressure zone pump (typ 4), for the unit price of:		
	_____ (ADD/DEDUCT UNIT PRICE)	$_____	$_____
8.	4 each of eliminate upper pressure zone variable speed drives, for the unit price of:		
	_____ (ADD/DEDUCT UNIT PRICE)	$_____	$_____

Refer to unit price bid schedule.

Unit Prices have been computed in accordance with paragraph 11.03.B of the General Conditions.

Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities provided, determined as provided in the Contract Documents.

6.01 Bidder agrees that the Work will be substantially completed and completed and ready for final payment in accordance with paragraph 14.07.B of the General Conditions on or before the dates or within the number of calendar days indicated in Section 00520, Standard Form of Agreement between Owner and Contractor.

6.02 Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the times specified above, which shall be stated in the Agreement.

7.01 The following documents are attached to and made a condition of this Bid:

A. Required Bid security in the form of bid bond or certified check.

B. Section 00410, Bid Form.

C. Section 00432, Tabulation of Subcontractors.

D. Attachment 4-14: Subcontractor Eligibility

E. Attachment 4-B: Lobbying Certification for Contracts, Grants, Loans and Cooperative Agreement

8.01 The terms used in this Bid with initial capital letters have the meanings indicated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

SUBMITTED on _____, 20___.

State Contractor License No. _____ (If applicable)

State of Wisconsin
Department of Natural Resources
Bureau of Community Financial Assistance
101 S. Webster St., PO Box 7921
Madison WI 53707-7921
Phone No. (608) 266-7555 FAX (608) 267-0496
website: dnr.wi.gov/org/caer/cfa/cfindex.html

Environmental Improvement Fund (EIF)
MBE/WBE/SBRA Contacts Worksheet

Form 8700-294A (R 6/06)

Notice: Under ss. NR 162.09(3), NR 166.12(4), and NR 167.18(4), Wis. Adm. Code, a municipality is required to provide complete information to verify that it has met Minority Business Enterprise (MBE), Women Business Enterprise (WBE), and if applicable, Small Business in Rural Areas (SBRA) goals. The Department will not complete a financial assistance agreement unless the municipality submits documentation regarding MBE/WBE/SBRA solicitation or utilization. Failure to provide information requested, meet the goals, or make a good faith effort may result in sanctions described in s. NR 162.09(3)(b), s. NR 166.12(4)(e), or s. NR 167.18(4)(e), Wis. Adm. Code. Personally identifiable information provided on this form will be used to review MBE/WBE/SBRA participation in a project and may also be made available to requesters as required by Wisconsin Open Records law [ss. 19.31 - 19.39, Wis. Stats.].

You may use this worksheet as a tool to provide required backup information to Environmental Improvement Fund MBE/WBE/SBRA Good Faith Certification (Form 8700-294). You may also provide information requested on this form in some other format. If your municipality receives state funds for your project, you must make a good faith effort to use WBEs and MBEs. If your project is designated as a federal equivalency project, include SBRAs in addition to MBEs and WBEs in your solicitation efforts. **Five contacts for each type of firm shows a good faith effort.**

☐ Clean Water Fund Program ☐ Safe Drinking Water Loan Program ☐ Land Recycling Loan Program

Project Information

Name of Municipality	EIF Project Number

Name of Prime Contractor	Information Prepared By (Name and Phone)

Contacts

Information Needed For Review	Contact 1	Contact 2	Contact 3
a. Name of Firm Contacted			
b. Contact's Phone Number			
c. Firm Type	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA
d. Is firm self-certified or agency-certified?	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____
e. Date Contacted			
f. Result of contact			
g. Bid received?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
h. If bid received and rejected, why rejected?			
i. Utilizing this firm? (If yes, more on p. 4)*	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Information Needed For Review	Contact 4	Contact 5	Contact 6
a. Name of Firm Contacted			
b. Contact's Phone Number			
c. Firm Type	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA
d. Is firm self-certified or agency-certified?	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____
e. Date Contacted			
f. Result of contact			
g. Bid received?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
h. If bid received and rejected, why rejected?			
i. Utilizing this firm? (If yes, more on p. 4)*	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Information Needed For Review	Contact 7	Contact 8	Contact 9
a. Name of Firm Contacted			
b. Contact's Phone Number			
c. Firm Type	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA
d. Is firm self-certified or agency-certified?	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____
e. Date Contacted			
f. Result of contact			
g. Bid received?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
h. If bid received and rejected, why rejected?			
i. Utilizing this firm? (If yes, more on p. 4)*	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Information Needed For Review	Contact 10	Contact 11	Contact 12
a. Name of Firm Contacted			
b. Contact's Phone Number			
c. Firm Type	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA
d. Is firm self-certified or agency-certified?	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____
e. Date Contacted			
f. Result of contact			
g. Bid received?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
h. If bid received and rejected, why rejected?			
i. Utilizing this firm? (If yes, more on p. 4)*	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Information Needed For Review	Contact 13	Contact 14	Contact 15
a. Name of Firm Contacted			
b. Contact's Phone Number			
c. Firm Type	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA
d. Is firm self-certified or agency-certified?	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____
e. Date Contacted			
f. Result of contact			
g. Bid received?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
h. If bid received and rejected, why rejected?			
i. Utilizing this firm? (If yes, more on p. 4)*	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Information Needed For Review	Contact 16	Contact 17	Contact 18
a. Name of Firm Contacted			
b. Contact's Phone Number			
c. Firm Type	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA
d. Is firm self-certified or agency-certified?	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____
e. Date Contacted			
f. Result of contact			
g. Bid received?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
h. If bid received and rejected, why rejected?			
i. Utilizing this firm? (If yes, more on p. 4)*	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Information on Utilized Firms (Utilized firms that are self-certified must submit a Self-Certification form [Form 8700-295 for MBEs, Form 8700-296 for WBEs])

Business Name	Street Address	City, State, Zip	Type of Product or Service	Subcontract Amount

If Bidder is:

An Individual

Name (typed or printed): _____

By: _____ (SEAL)
(Individual's signature)
Doing business as: _____
Business address: _____
_____
Phone No.: _____ FAX No.: _____

A Partnership

Partnership Name: _____ (SEAL)

By: _____
(Signature of general partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Business address: _____
_____
Phone No.: _____ FAX No.: _____

A Corporation

Corporation Name: _____ (SEAL)
State of Incorporation: _____
Type (General Business, Professional, Service, Limited Liability):_____

By: _____
(Signature -- attach evidence of authority to sign)
Name (typed or printed): _____

Title: _ (CORPORATE SEAL)

Attest _____
(Signature of Corporate Secretary)

Business address: _____
_____
Phone No.: _____ FAX No.: _____

Date of Qualification to do business is _____.

A Joint Venture

Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Business address: _____
_____

Phone No.: _____ FAX No.: _____

Joint Venturer Name: _____ (SEAL)

By: _____
(Signature -- attach evidence of authority to sign)

Name (typed or printed): _____
Title: _____
Business address: _____
_____
Phone No.: _____ FAX No.: _____

Phone and FAX Number, and Address for receipt of official communications:

_____

_____

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

ATTACHMENT 4-B: LOBBYING CERTIFICATION FOR CONTRACTS, GRANTS, LOANS & COOPERATIVE AGREEMENTS

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No federally appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.

2. If any funds other than federally appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this federal contract, grant, loan, or cooperative agreement, the undersigned shall complete Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

3. The undersigned shall require that the language of this CERTIFICATION be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This CERTIFICATION is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this CERTIFICATION is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required CERTIFICATION shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

_____ _____

(Signature of Chief Executive Officer) ***(Date)***

_____

(Name of Business/Firm)

ATTACHMENT 4-14: SUBCONTRACTOR ELIGIBILITY

Name of firm_____

Business address_____

Home address_____

Business phone_____

Home phone_____

Social Security number_____

Amount of your subcontract on this project $_____

Sole Proprietor_____ Partnership_____Corporation_____

Describe your work on this project:_____

_____

Who pays for the building materials you use?_____

Is your work "labor only" service?_____

Do you provide your own tools on this project?_____

If not, who does?_____

Are you paid by Lump Sum_____ Amount $_____

By the hour_____ Amount per hour $_____

Piece work_____ How much $_____

Is this your first subcontract?____ If not, list other construction projects you have worked on as a contractor or subcontractor:_____

_____

_____

On this project do you expect to hire or employ anyone else to work for you in completing your work?

_____

On previous projects as a subcontractor have you hired anyone else to work for you?

_____

If this is your first subcontract, for whom did you previously work just prior to your work on this project?

_____

Do you carry liability insurance?_____

Are you employed by any other firm while you are working on this project?_____

Name of firm_

What deductions from the gross amount of your subcontract are made?_____

Federal or state taxes_____ By whom_____

Social Security taxes_____ By whom_____

Other deductions_____ By whom_____

_____
(Signature)

_____
(Title)

_____
(Date)

SECTION 00431

BASE BID, SUBSTITUTE, AND "OR EQUALS" SCHEDULE

At the time of bid, Bidder shall identify one or more proposed "or equals" and/or substitutes meeting the requirements of paragraph 6.05 of the General Conditions for the following items identifying the comparative cost with the specified "named" item. The purpose of this schedule is to identify any proposed substitute and "or equals" for these specific items.

If Engineer and Owner believe consideration of the proposed items will result in a cost savings, then the apparent low bidder shall submit sufficient information for evaluation; in accordance with paragraph 6.05 of the General Conditions.

Note: Contractor SHALL circle the named equipment manufacturer being provided under the base bid.

PUETZ ROAD BOOSTER STATION
PART A—BOOSTER STATION CONSTRUCTION
CONTRACT NO. 4931-09-01

Specification Section	Named Equipment	Proposed Substitute "Or Equal"	Base Bid Price Adjustment	
			Add To	Deduct From
15100	Val-Matic, Dezurik		$	$
16622	Cummins, Kohler Caterpillar		$	$
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$

SECTION 00432

TABULATION OF SUBCONTRACTORS

The following subcontractors will be utilized for portions of the project work. Changes shall not be made subsequent to the bid unless the change(s) is approved by the Owner.

PUETZ ROAD BOOSTER STATION
PART A—BOOSTER STATION CONSTRUCTION
CONTRACT NO. 4931-09-01

Subcontractor	Classification of Work	Estimated Dollar Amount
	Landscaping	
	Asphalt	
	Concrete/Structure	
	Mechanical	
	Electrical	
	HVAC	
	Site Work	
	Plumbing	
	Painting	

SECTION 00435

BID BOND

BIDDER (Name and Address):

_____

_____

_____

SURETY (Name and Address of Principal Place of Business):

_____

_____

_____

OWNER (Name and Address):

OAK CREEK WATER AND SEWER UTILITY

170 WEST DREXEL AVENUE

OAK CREEK, WI 53154

BID

BID DUE DATE: _____

PROJECT (Brief Description Including Location):

Part A - Booster Station Construction; Contract 4931-09-01

BOND

BOND NUMBER: _____

DATE (Not later than Bid due date): _____

PENAL SUM: _____ _____

(Words) (Figures)

IN WITNESS WHEREOF, Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

BIDDER	SURETY
_____ (Seal)	_____ (Seal)
Bidder's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature and Title	Signature and Title (Attach Power of Attorney)
Attest: _____	Attest: _____
Signature and Title	Signature and Title

Note: (1) Above addresses are to be used for giving required notice.

(2) Any singular reference to Bidder, Surety, OWNER or other party shall be considered plural where applicable.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to OWNER upon default of Bidder the penal sum set forth on the face of this Bond.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment Bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

3.1. OWNER accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment Bonds required by the Bidding Documents, or

3.2. All Bids are rejected by OWNER, or

3.3. OWNER fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from OWNER, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of and any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by OWNER and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power or Attorney evidencing the authority of the officer, agent or representative who executed this Bond on behalf of Surety to execute, seal and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer or proposal as applicable.

OWNER'S REPRESENTATIVES:

Robert E. Lee & Associates, Inc.
4664 Golden Pond Park Court
Hobart, WI 54155
(920) 662-9641
(920) 662-9141 (Fax)

AGENT OR BROKER:

Name: _____

Address: _____

Phone: _____

Fax: _____

Section C-510
Notice of Award

Date: _____

Project: Puetz Road Booster Station;

Part A--Booster Station Construction

Owner: OAK CREEK WATER AND SEWER UTILITY	Owner's Contract No.: 4931-09-01
Contract: 4931-09-01	Engineer's Project No.: 4931-001

Bidder:

Bidder's Address: *[send Notice of Award Certified Mail, Return Receipt Requested]*

You are notified that your Bid dated _____ for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for _____

[Indicate total Work, alternates, or sections of Work awarded.]

The Contract Price of your Contract is _____ Dollars ($_____).

[Insert appropriate data if unit prices are used. Change language for cost-plus contracts.]

_____ copies of the proposed Contract Documents (except Drawings) accompany this Notice of Award.

_____ sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within [15] days of the date you receive this Notice of Award.

1. Deliver to the Owner [_____] fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Contract security [Bonds] as specified in the Instructions to Bidders (Article 20), General Conditions (Paragraph 5.01), and Supplementary Conditions (Paragraph SC-5.01).
3. Other conditions precedent:

   _____

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Contract Documents.

OAK CREEK WATER AND SEWER UTILITY
Owner

By: _____
Authorized Signature

_____
Title

Copy to Engineer

SECTION 00520
STANDARD FORM OF AGREEMENT
BETWEEN OWNER AND CONTRACTOR
ON THE BASIS OF A STIPULATED PRICE

THIS AGREEMENT is by and between OAK CREEK WATER AND SEWER UTILITY

(hereinafter called OWNER) and _____

(hereinafter called CONTRACTOR).

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1 - WORK

1.01 CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

Puetz Road Booster Station; Contract No. 4931-09-01
Part A--Booster Station Construction

ARTICLE 2 - THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Puetz Road Booster Station; Contract No. 4931-09-01
Part A--Booster Station Construction

ARTICLE 3 - ENGINEER

3.01 The Project has been designed by Robert E. Lee & Associates, Inc., who is hereinafter called ENGINEER and who is to act as OWNER's representative, assume all duties and responsibilities, and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 - CONTRACT TIMES

4.01 Time of the Essence

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 Days to Achieve Substantial Completion and Final Payment

A. **Part A--Booster Station Construction**. The Work will be substantially completed within 270 days after the date when the Contract Times commence to run as provided in paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with paragraph 14.07 of the General Conditions within 300 days after the date when the Contract Times commence to run.

4.03 Liquidated Damages

A. CONTRACTOR and OWNER recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty), CONTRACTOR shall pay OWNER **$1,000** each day that expires after the time specified in paragraph 4.02 for Substantial Completion until the Work is substantially complete. After Substantial Completion, if CONTRACTOR shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER **$500** for each day that expires after the time specified in paragraph 4.02 for Final Completion and readiness for final payment until the Work is completed and ready for final payment. The owner reserves the right to deduct the amount of the liquidated damages from the final payment or retainage.

ARTICLE 5 - CONTRACT PRICE

5.01 OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to paragraphs 5.01.A, 5.01.B, and 5.01.C below:

A. For all Work other than Unit Price Work, a Lump Sum of:

_____

_____ (words)

_____ (figure)

All specific cash allowance, if applicable, are included in the above price and have been computed in accordance with paragraph 11.02 of the General Conditions.

B. For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of that item as indicated in this paragraph:

_____

_____ (words)

_____ (figure)

As provided in paragraph 11.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by ENGINEER as provided in paragraph 9.08 of the General Conditions. Unit prices have been computed as provided in paragraph 11.03 of the General Conditions.

C. For all Work, at the prices stated in CONTRACTOR's Bid, attached hereto as an exhibit.

ARTICLE 6 - PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

A. CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

6.02 Progress Payments; Retainage

A. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment on or ***before*** the **1st day of each month** during performance of the Work as provided in paragraphs 6.02.A.1 and 6.02.A.2 below. ***If the application for payment is not received by the date specified, the payment shall be delayed to the next scheduled approval date.*** All such payments will be measured by the schedule of values established in paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements:

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as ENGINEER may determine or OWNER may withhold, in accordance with paragraph 14.02 of the General Conditions:

   a. 95% of Work completed (with the balance being retainage). When the Work has been 50% completed as determined by ENGINEER, and if the character and progress of the Work have been satisfactory to OWNER and ENGINEER, OWNER, on recommendation of ENGINEER, may determine that as long as the character and progress of the Work remain satisfactory to them, there will be no retainage on account of Work subsequently completed, in which case the remaining progress payments prior to Substantial Completion will be in an amount equal to 100% of the Work completed less the aggregate of payments previously made; and

2. Upon Substantial Completion, OWNER shall pay an amount sufficient to increase total payments to CONTRACTOR to 95% of the Work completed, less such amounts as ENGINEER shall determine in accordance with paragraph 14.02.B.5 of the General Conditions.

6.03 Final Payment

A. Upon final completion and acceptance of the Work in accordance with paragraph 14.07 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said paragraph 14.07.

ARTICLE 7 - INTEREST

7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at a rate equal to the daily prime lending rate as published in the Wall Street Journal plus 1.5%.

ARTICLE 8 - CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce OWNER to enter into this Agreement CONTRACTOR makes the following representations:

A. CONTRACTOR has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. CONTRACTOR has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. CONTRACTOR is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. CONTRACTOR has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions and (2) reports and drawings of a Hazardous Environmental Condition, if any, at the Site which has been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions.

E. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR, including applying the specific means, methods, techniques, sequences, and procedures of construction, if any, expressly required by the Contract Documents to be employed by CONTRACTOR, and safety precautions and programs incident thereto

F. CONTRACTOR does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

G. CONTRACTOR is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Contract Documents.

H. CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

I. CONTRACTOR has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that CONTRACTOR has discovered in the Contract Documents, and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

J. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 9 - CONTRACT DOCUMENTS

9.01 Contents of Contract Documents

A. The Contract Documents consist of the following:

1. This Agreement (pages 00520RD-1 to 00520RD-8, inclusive);

2. Performance Bond (pages C-610-1 to C-610-4, inclusive);

3. Payment Bond (pages C-615-1 to C-615-3, inclusive);

4. Bid Bond (pages 00435-1 to 00435-3, inclusive);

5. Other Bonds (pages _____ to _____, inclusive);

   a. _____ (pages _____ to _____, inclusive);

   b. _____ (pages _____ to _____, inclusive);

   c. _____ (pages _____ to _____, inclusive);

6. General Conditions (pages C-710-1 to C-710-57, inclusive);

7. Supplementary Conditions (pages 00800RD-1 to 00800RD-7, inclusive);

8. Specifications as listed in the table of contents of the Project Manual;

9. Drawings consisting of a cover sheet and sheets numbered 1 through 53, inclusive, with each sheet bearing the following general title: Oak Creek Water and Sewer Utility; Milwaukee County, Wisconsin; Puetz Road Booster Station; Contract A—Booster Station Construction and Contract B Transmission Main Construction;

10. Addenda (numbers _____ to _____, inclusive);

11. Exhibits to this Agreement (enumerated as follows):

a. Notice to Proceed (pages 00550-1 to 00550-1, inclusive);

b. CONTRACTOR's Bid (pages 00410-1 to 00410-16, inclusive);

c. Documentation submitted by CONTRACTOR prior to Notice of Award (pages 00410-1 to 00435-3, inclusive);

12. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:

a. Written Amendments;

b. Work Change Directives;

c. Change Order(s).

B. The documents listed in paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 9.

D. The Contract Documents may only be amended, modified, or supplemented as provided in paragraph 3.05 of the General Conditions.

9.02 Legal Documents

A. The legal documents are a subset of the contract documents which form the Agreement for services by and between the Owner and Contractor.

B. The legal documents consist of the following:
1. Notice of Award (Pages C-510-1 to C-510-1, inclusive).

2. This Agreement (Pages 00520RD-1 to 00520RD-8, inclusive).

ARTICLE 10 - MISCELLANEOUS

10.01 Terms

A. Terms used in this Agreement will have the meanings indicated in the General Conditions.

10.02 Assignment of Contract

A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment

will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 Successors and Assigns

A. OWNER and CONTRACTOR each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 Severability

A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon OWNER and CONTRACTOR, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in duplicate. One counterpart each has been delivered to OWNER and CONTRACTOR. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or on their behalf.

This Agreement will be effective on _____ (which is the Effective Date of the Agreement).

OWNER:
OAK CREEK WATER AND SEWER UTILITY

By: _____

[CORPORATE SEAL]

Attest _

Address for giving notices:
Oak Creek Water And Sewer Utility
170 West Drexel Avenue
Oak Creek, WI 53154

(If OWNER is a corporation, attach evidence of authority to sign. If OWNER is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of OWNER-CONTRACTOR Agreement.)

Designated Representative:

Name: Mike Sullivan

Title: Utility Engineer

Address: 170 West Drexel Avenue
Oak Creek, WI 53154

Phone: 1-414-570-8210

Facsimile: 1-414-570-8215

CONTRACTOR:
_____

By: _____

[CORPORATE SEAL]

Attest _

Address for giving notices:
_____
_____
_____

License No. _____
(Where applicable)

Agent for service of process: _____

(If CONTRACTOR is a corporation or a partnership, attach evidence of authority to sign.)

Designated Representative:

Name: _____

Title: _____

Address: _____
_____

Phone: _____

Facsimile: _____

AGENCY CONCURRENCE:

As lender or insurer of funds to defray the costs of this contract, and without liability for any payments thereunder, the Agency here by concurs in the form, content, and execution of this agreement.

By: _____

Title: _____

Date: _____

SECTION 00550
NOTICE TO PROCEED

Dated _____

TO: _____
(CONTRACTOR)

ADDRESS: _____

_____

Contract: 4931-09-01

Project: PUETZ ROAD BOOSTER STATION
PART A--BOOSTER STATION CONSTRUCTION

You are notified that the Contract Times under the above contract will commence to run on _____ _____. By that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Agreement the date of Substantial Completion is _____ and the date of readiness for final payment is _____.

Before you may start any Work at the Site, paragraph 2.05.C of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must

_____

_____

_____

OAK CREEK WATER AND SEWER UTILITY
(OWNER)

By: _____
(AUTHORIZED SIGNATURE)

_____
(TITLE)

Copy to ENGINEER

Acceptance of Notice: Receipt of the above Notice to Proceed is hereby acknowledged by:

_____ _____
(CONTRACTOR REPRESENTATIVE) (DATE)

_____
(TITLE)

SECTION 00555

REQUEST FOR INTERPRETATION

ROBERT E. LEE & ASSOCIATES, INC.
4664 Golden Pond Park Court
Hobart, WI 54155
Telephone: (920) 662-9641
Fax: (920) 662-9141

NAME: _____

COMPANY: _____

ADDRESS: _____

TELEPHONE _____ FAX: _____

_____ Contractor _____ Subcontractor _____ Vendor

RE: _____ Specification Section _____ Page _____

_____ Plan Sheet/Drawing _____ Section/Detail _____

QUESTION: _____

INTERPRETATION (For Engineer Use): _____

- END OF SECTION -

SECTION 00560

WORK CHANGE DIRECTIVE No. _____

Owner: OAK CREEK WATER AND SEWER UTILITY Robert E. Lee & Associates, Inc. 4931-001
Project No. _____

Project: Puetz Road Booster Station Contract No. 4931-09-01
Part A--Booster Station Construction

Date of Issuance: _____

You are directed to proceed with the following change(s):

Description:

Purpose of Work Change Directive:

Attachments:

If Owner or Contractor believe that the above change has affected Contract Price, any Claim for a Change Order based thereon will involve one or more of the following methods as defined in the Contract Documents.

Method of determining change in Contract Price:

- ☐ Lump Sum
- ☐ Unit Prices
- ☐ Cost of the Work

Estimated increase (decrease) in Contract Price:

$ _____

Estimated increase (decrease) in Contract Times:

Substantial Completion: ___ days;
Ready for final payment: ___ days.

If the change involves an increase, the estimated amount is not to be exceeded without further authorization.

Acknowledged:

By: _____
Robert E. Lee & Associates, Inc.

Date: _____

Approved:

By: _____
Owner - Oak Creek Water And Sewer Utility

Date: _____

CC:

OWNER COPY
ENGINEER COPY
CONTRACTOR COPY
FILE COPY

SECTION 00572

FIELD ORDER FORM
ITEM NO. _____

OWNER OAK CREEK WATER AND SEWER UTILITY

PROJECT PUETZ ROAD BOOSTER STATION;
PART A--BOOSTER STATION CONSTRUCTION

CONTRACTOR _____

CONTRACT NO. 4931-09-01

DATE _____

THIS CHANGE IS REQUESTED BY _____

DESCRIPTION OF ORDER: _____

Refer to Drawing Sheets _____ Section or Detail _____

Refer to Specification Paragraphs _____

Will additional drawings be necessary? Yes [ ] No [ ]

It is understood and mutually agreed that this form is to be used only to record minor orders which do not increase or decrease the contract price or change the intent of a specific provision of the contract. Any orders involving change to the contract price or contract requirements must be covered by a formal change order executed by the Owner and the Contractor.

FOR ROBERT E. LEE & ASSOCIATES	FOR CONTRACTOR	FOR OAK CREEK WATER AND SEWER UTILITY
_____	_____	_____
Date _____	Date _____	Date _____

SECTION C-610
PERFORMANCE BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):
OAK CREEK WATER AND SEWER UTILITY
170 West Drexel Avenue
Oak Creek, WI 53154

CONTRACT
Effective Date of Agreement:
Amount:
Description (*Name and Location*): Puetz Road Booster Station; Contract No. 4931-09-01
Part A--Booster Station Construction

BOND
Bond Number:
Date (*Not earlier than Effective Date of Agreement*):
Amount:
Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

_____ (Seal)
Contractor's Name and Corporate Seal

By: _____
Signature

_____
Print Name

_____
Title

Attest: _____
Signature

_____
Title

SURETY

_____ (Seal)
Surety's Name and Corporate Seal

By: _____
Signature (Attach Power of Attorney)

_____
Print Name

_____
Title

Attest: _____
Signature

_____
Title

Note: Provide execution by additional parties, such as joint venturers, if necessary.

Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner for the performance of the Contract, which is incorporated herein by reference.

1. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 2.1.

2. If there is no Owner Default, Surety's obligation under this Bond shall arise after:
   2.1 Owner has notified Contractor and Surety, at the addresses described in Paragraph 9 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor, and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and
   2.2 Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 2.1; and
   2.3 Owner has agreed to pay the Balance of the Contract Price to:
      1. Surety in accordance with the terms of the Contract; or
      2. Another contractor selected pursuant to Paragraph 3.3 to perform the Contract.

3. When Owner has satisfied the conditions of Paragraph 2, Surety shall promptly, and at Surety's expense, take one of the following actions:

   3.1 Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or
   3.2 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
   3.3 Obtain bids or negotiated proposals from qualified contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 5 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or
   3.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:
      1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or
      2. Deny liability in whole or in part and notify Owner citing reasons therefor.

4. If Surety does not proceed as provided in Paragraph 3 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 3.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.

5. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 3.1, 3.2, or 3.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To the limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

5.1 The responsibilities of Contractor for correction of defective Work and completion of the Contract;
5.2 Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions of or failure to act of Surety under Paragraph 3; and
5.3 Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.

6. Surety shall not be liable to Owner or others for obligations of Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than Owner or its heirs, executors, administrators, or successors.

7. Surety hereby waives notice of any change, including changes of time, to Contract or to related subcontracts, purchase orders, and other obligations.

8. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located, and shall be instituted within two years after Contractor Default or within two years after Contractor ceased working or within two years after Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

9. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.

10. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

11. Definitions.

11.1 Balance of the Contract Price: The total amount payable by Owner to Contractor under the Contract after all proper adjustments have been made, including allowance to Contractor of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Contractor is entitled, reduced by all valid and proper payments made to or on behalf of Contractor under the Contract.
11.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
11.3 Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
11.4 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – (*Name, Address and Telephone*)
Surety Agency or Broker:
Owner's Representative (*Engineer or other party*): Robert E. Lee & Associates, Inc.
(Kimberly Kimmes, Project Manager)
4664 Golden Pond Park Court
Hobart, WI 54155

SECTION C-615A
PAYMENT BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):
OAK CREEK WATER AND SEWER UTILITY
170 West Drexel Avenue
Oak Creek, WI 53154

CONTRACT
Effective Date of Agreement:
Amount:
Description *(Name and Location)*: Puetz Road Booster Station; Contract No. 4931-09-01
Part A--Booster Station Construction

BOND
Bond Number:
Date (*Not earlier than Effective Date of Agreement*):
Amount:
Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

_____ (Seal)
Contractor's Name and Corporate Seal

By: _____
Signature

_____
Print Name

_____
Title

Attest: _____
Signature

_____
Title

SURETY

_____ (Seal)
Surety's Name and Corporate Seal

By: _____
Signature (Attach Power of Attorney)

_____
Print Name

_____
Title

Attest: _____
Signature

_____
Title

Note: Provide execution by additional parties, such as joint venturers, if necessary.

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.

2. With respect to Owner, this obligation shall be null and void if Contractor:

2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and

2.2 Defends, indemnifies, and holds harmless Owner from all claims, demands, liens, or suits alleging non-payment by Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided Owner has promptly notified Contractor and Surety (at the addresses described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to Contractor and Surety, and provided there is no Owner Default.

3. With respect to Claimants, this obligation shall be null and void if Contractor promptly makes payment, directly or indirectly, for all sums due.

4. Surety shall have no obligation to Claimants under this Bond until:

4.1 Claimants who are employed by or have a direct contract with Contractor have given notice to Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

4.2 Claimants who do not have a direct contract with Contractor:

1. Have furnished written notice to Contractor and sent a copy, or notice thereof, to Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and
2. Have either received a rejection in whole or in part from Contractor, or not received within 30 days of furnishing the above notice any communication from Contractor by which Contractor had indicated the claim will be paid directly or indirectly; and
3. Not having been paid within the above 30 days, have sent a written notice to Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to Contractor.

5. If a notice by a Claimant required by Paragraph 4 is provided by Owner to Contractor or to Surety, that is sufficient compliance.

6. Reserved

7. Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by Surety.

8. Amounts owed by Owner to Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By Contractor furnishing and Owner accepting this Bond, they agree that all funds earned by Contractor in the performance of the Contract are dedicated to satisfy obligations of Contractor and Surety under this Bond, subject to Owner's priority to use the funds for the completion of the Work.

9. Surety shall not be liable to Owner, Claimants, or others for obligations of Contractor that are unrelated to the Contract. Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

10. Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders, and other obligations.

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, Owner, or Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. Definitions

15.1 Claimant: An individual or entity having a direct contract with Contractor, or with a first-tier subcontractor of Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of Contractor and Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

15.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

15.3 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract, or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – (*Name, Address, and Telephone*)
Surety Agency or Broker:
Owner's Representative (*Engineer or other*):
Robert E. Lee & Associates, Inc. (Kimberly Kimmes, Project Manager)
4664 Golden Pond Park Court
Hobart, WI 54155
(920)662-9641

SECTION C-620
APPLICATION FOR PAYMENT

Contractor's Application for Payment No.

	Application Period:	Application Date:
To (Owner): Oak Creek Water and Sewer Utility	From (Contractor):	Via (Engineer): Robert E. Lee & Associates, Inc.
Project: Puetz Road Booster Station; Part A--Booster Station Construction	Contract: 4931-09-01	
Owner's Contract No.: 4931-09-01	Contractor's Project No.:	Engineer's Project No.: 4931-001

Application For Payment
Change Order Summary

Approved Change Orders		
Number	Additions	Deductions
TOTALS		
NET CHANGE BY CHANGE ORDERS		

1. **ORIGINAL CONTRACT PRICE**..... $ _____
2. **Net change by Change Orders**..... $ _____
3. **Current Contract Price (Line 1 ± 2)**..... $ _____
4. **TOTAL COMPLETED AND STORED TO DATE (Column F on Progress Estimate)**..... $ _____
5. **RETAINAGE:**
   - a. X _____ **Work Completed**..... $ _____
   - b. X _____ **Stored Material**..... $ _____
   - c. **Total Retainage (Line 5a + Line 5b)**..... $ _____
6. **AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c)**..... $ _____
7. **LESS PREVIOUS PAYMENTS (Line 6 from prior Application)**..... $ _____
8. **AMOUNT DUE THIS APPLICATION**..... $ _____
9. **BALANCE TO FINISH, PLUS RETAINAGE (Column G on Progress Estimate + Line 5 above)**..... $ _____

Contractor's Certification

The undersigned Contractor certifies that to the best of its knowledge: (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Applications for Payment; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to Owner indemnifying Owner against any such Liens, security interest or encumbrances); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

By:	Date:

Payment of: $ _____
(Line 8 or other - attach explanation of the other amount)

is recommended by: _____ _____
(Engineer) (Date)

Payment of: $ _____
(Line 8 or other - attach explanation of the other amount)

is approved by: _____ _____
(Owner) (Date)

Approved by: _____ _____
Funding Agency (if applicable) (Date)

Endorsed by the Construction Specifications Institute.

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Progress Estimate

Contractor's Application

For (contract): 4931-09-01	Application Number:
Application Period:	Application Date:

A		B	Work Completed		E	F		G
Item			C	D				
Specification Section No.	Description	Scheduled Value	From Previous Application (C+D)	This Period	Materials Presently Stored (not in C or D)	Total Completed and Stored to Date (C + D + E)	% (F) B	Balance to Finish (B - F)
	Totals							

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Progress Estimate

Contractor's Application

For (contract): 4931-09-01							Application Number:		
Application Period:							Application Date:		
A				B	C	D	E	F	
Item		Bid Quantity	Unit Price	Bid Value	Estimated Quantity Installed	Value	Materials Presently Stored (not in C)	Total Completed and Stored to Date (D + E)	% (F) B	Balance to Finish (B - F)
Bid Item No.	Description									
	Totals									

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Stored Material Summary

Contractor's Application

For (contract): 4931-09-01							Application Number:		
Application Period:							Application Date:		
A	B	C	D		E		F		G
Invoice No.	Shop Drawing Transmittal No.	Materials Description	Stored Previously		Stored this Month		Incorporated in Work		Materials Remaining in Storage ($) (D + E - F)
			Date (Month/Year)	Amount ($)	Amount ($)	Subtotal	Date (Month/Year)	Amount ($)	
		Totals							

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OWNER COPY
ENGINEER COPY
CONTRACTOR COPY
FILE COPY

SECTION 00625

CERTIFICATE OF SUBSTANTIAL COMPLETION

DATE OF ISSUANCE _____

OWNER OAK CREEK WATER AND SEWER UTILITY
CONTRACTOR _____
Contract: 4931-09-01
Project: Puetz Road Booster Station
Part A--Booster Station Construction

This Certificate of Substantial Completion applies to all Work under the Contract Documents or to the following specified parts thereof:

To OAK CREEK WATER AND SEWER UTILITY
OWNER

And To _____
CONTRACTOR

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR and ENGINEER, and that Work is hereby declared to be substantially complete in accordance with the Contract Documents on

_____
DATE OF SUBSTANTIAL COMPLETION

A tentative list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include an item in it does not alter the responsibility of CONTRACTOR to complete all the Work in accordance with the Contract Documents. The items in the tentative list shall be completed or corrected by CONTRACTOR within _____ days of the above date of Substantial Completion.

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties and guarantees shall be as follows:

OWNER:_____

_____

_____

CONTRACTOR: _____

_____

_____

_____

The following documents are attached to and made a part of this Certificate:

This certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of CONTRACTOR's obligation to complete the Work in accordance with the Contract Documents.

Executed by ENGINEER on _____
Date

ROBERT E. LEE & ASSOCIATES, INC.
ENGINEER

By: _____
(Authorized Signature)

CONTRACTOR accepts this Certificate of Substantial Completion on _____
Date

_____
CONTRACTOR

By: _____
(Authorized Signature)

OWNER accepts this Certificate of Substantial Completion on _____
Date

OAK CREEK WATER AND SEWER UTILITY
OWNER

By: _____
(Authorized Signature)

OWNER COPY
ENGINEER COPY
CONTRACTOR COPY
FILE COPY

SECTION 00626

STATEMENT OF SURETY COMPANY

IN ACCORDANCE with the provisions of the CONTRACT dated _____

_____ between the _____

OAK CREEK WATER AND SEWER UTILITY
(OWNER)

and _____
(CONTRACTOR)

the _____
(SURETY)

SURETY on the Material and Labor Payment BOND of _____

_____

after a careful examination of the books and records of said CONTRACTOR or after receipt of an affidavit from CONTRACTOR, which examination of affidavit satisfies SURETY that all claims for labor and materials have been satisfactorily settled, hereby approves of the final payment of the said _____
(CONTRACTOR)

and by these presents witnesseth that payment to the CONTRACTOR of the final estimates shall not relieve SURETY of any of its obligations to _____
_____, as set forth in the said SURETY COMPANY'S BOND.

IN WITNESS WHEREOF, said SURETY has hereunto set its hand and seal this _____ day of _____, 20___.

Attest:

(Seal) _____ By: _____
President

_____

Note: This statement, if executed by any person other than the President or Vice-President of the Company, must be accompanied by a certificate of even date showing authority conferred upon the person so signing to execute such instruments on behalf of the Company represented.

OWNER COPY
ENGINEER COPY
CONTRACTOR COPY
FILE COPY

SECTION 00628

CERTIFICATE OF FINAL COMPLETION

DATE OF ISSUANCE _____

OWNER OAK CREEK WATER AND SEWER UTILITY
CONTRACTOR _____
Contract: 4931-09-01
Project: Puetz Road Booster Station
Part A--Booster Station Construction

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR and ENGINEER, and that Work is hereby declared to be completed in accordance with the Contract Documents on

_____
DATE OF FINAL COMPLETION

Executed by ENGINEER on _____
Date

ROBERT E. LEE & ASSOCIATES, INC.
ENGINEER

By: _____
(Authorized Signature)

CONTRACTOR accepts this Certificate of Final Completion on _____
Date

_____
CONTRACTOR

By: _____
(Authorized Signature)

OWNER accepts this Certificate of Final Completion on _____
Date

OAK CREEK WATER AND SEWER UTILITY
OWNER

By: _____
(Authorized Signature)

Part B

SECTION 00410
BID FORM

PROJECT IDENTIFICATION:

OAK CREEK WATER AND SEWER UTILITY
Puetz Road Booster Station
Part B--Transmission Main Construction
Contract No. 4931-09-01

CONTRACT IDENTIFICATION AND NUMBER:

Contract No. 4931-09-01
OAK CREEK WATER AND SEWER UTILITY
Puetz Road Booster Station
Part B--Transmission Main Construction

THIS BID IS SUBMITTED TO:

Personal Delivery before Bid Date:
OAK CREEK WATER AND SEWER UTILITY
170 WEST DREXEL AVENUE
OAK CREEK, WI 53154

Mail Delivery before Bid Date:
OAK CREEK WATER AND SEWER UTILITY
170 WEST DREXEL AVENUE
OAK CREEK, WI 53154

1.01 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with OWNER in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

2.01 Bidder accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. The Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of OWNER.

3.01 In submitting this Bid, Bidder represents, as set forth in the Agreement, that:

A. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of all which is hereby acknowledged.

Addendum No.	Addendum Date
_____	_____
_____	_____
_____	_____

B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions, and (2) reports and drawings of a Hazardous Environmental Condition, if any, which has been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions.

E. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.

F. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.

G. Bidder is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.

I. Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by ENGINEER is acceptable to Bidder.

J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

4.01 Bidder further represents that this Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any individual or entity to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

Part B – Transmission Main Construction (Unit Price)

_____(words)

_____(figures)

REQUIRED SUPPLEMENTAL BID ITEMS

Item	Description	Unit Price	Total Price
1.	Provide an add/deduct for the following: All iron, steel and manufactured goods incorporated in the project shall be produced as per requirements in specification section American Recovery and Reinvestment Act (ARRA) " Federal Stimulus Package" special requirements.		
	_____ (ADD/DEDUCT LUMP SUM)	$_____	$_____
2.	Provide an add/deduct for complying with Davis Bacon wage rates.		
	_____ (ADD/DEDUCT LUMP SUM)	$_____	$_____

Refer to unit price bid schedule.

Unit Prices have been computed in accordance with paragraph 11.03.B of the General Conditions.

Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities provided, determined as provided in the Contract Documents.

6.01 Bidder agrees that the Work will be substantially completed and completed and ready for final payment in accordance with paragraph 14.07.B of the General Conditions on or before the dates or within the number of calendar days indicated in Section 00520, Standard Form of Agreement between Owner and Contractor.

6.02 Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the times specified above, which shall be stated in the Agreement.

7.01 The following documents are attached to and made a condition of this Bid:

A. Required Bid security in the form of bid bond or certified check.

B. Section 00410, Bid Form.

C. Section 00432, Tabulation of Subcontractors.

D. Attachment 4-14: Subcontractor Eligibility

E. Attachment 4-B: Lobbying Certification for Contracts, Grants, Loans and Cooperative Agreement

8.01 The terms used in this Bid with initial capital letters have the meanings indicated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

SUBMITTED on _____, 20___.

State Contractor License No. _____ (If applicable)

State of Wisconsin
Department of Natural Resources
Bureau of Community Financial Assistance
101 S. Webster St., PO Box 7921
Madison WI 53707-7921
Phone No. (608) 266-7555 FAX (608) 267-0496
website: dnr.wi.gov/org/caer/cfa/cfindex.html

Environmental Improvement Fund (EIF)
MBE/WBE/SBRA Contacts Worksheet

Notice: Under ss. NR 162.09(3), NR 166.12(4), and NR 167.18(4), Wis. Adm. Code, a municipality is required to provide complete information to verify that it has met Minority Business Enterprise (MBE), Women Business Enterprise (WBE), and if applicable, Small Business in Rural Areas (SBRA) goals. The Department will not complete a financial assistance agreement unless the municipality submits documentation regarding MBE/WBE/SBRA solicitation or utilization. Failure to provide information requested, meet the goals, or make a good faith effort may result in sanctions described in s. NR 162.09(3)(b), s. NR 166.12(4)(e), or s. NR 167.18(4)(e), Wis. Adm. Code. Personally identifiable information provided on this form will be used to review MBE/WBE/SBRA participation in a project and may also be made available to requesters as required by Wisconsin Open Records law [ss. 19.31 - 19.39, Wis. Stats.].

You may use this worksheet as a tool to provide required backup information to Environmental Improvement Fund MBE/WBE/SBRA Good Faith Certification (Form 8700-294). You may also provide information requested on this form in some other format. If your municipality receives state funds for your project, you must make a good faith effort to use WBEs and MBEs. If your project is designated as a federal equivalency project, include SBRAs in addition to MBEs and WBEs in your solicitation efforts. **Five contacts for each type of firm shows a good faith effort.**

☐ Clean Water Fund Program ☐ Safe Drinking Water Loan Program ☐ Land Recycling Loan Program

Project Information

Name of Municipality	EIF Project Number

Name of Prime Contractor	Information Prepared By (Name and Phone)

Contacts

Information Needed For Review	Contact 1	Contact 2	Contact 3
a. Name of Firm Contacted			
b. Contact's Phone Number			
c. Firm Type	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA
d. Is firm self-certified or agency-certified?	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____
e. Date Contacted			
f. Result of contact			
g. Bid received?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
h. If bid received and rejected, why rejected?			
i. Utilizing this firm? (If yes, more on p. 4)*	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Information Needed For Review	Contact 4	Contact 5	Contact 6
a. Name of Firm Contacted			
b. Contact's Phone Number			
c. Firm Type	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA
d. Is firm self-certified or agency-certified?	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____
e. Date Contacted			
f. Result of contact			
g. Bid received?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
h. If bid received and rejected, why rejected?			
i. Utilizing this firm? (If yes, more on p. 4)*	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Information Needed For Review	Contact 7	Contact 8	Contact 9
a. Name of Firm Contacted			
b. Contact's Phone Number			
c. Firm Type	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA
d. Is firm self-certified or agency-certified?	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____
e. Date Contacted			
f. Result of contact			
g. Bid received?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
h. If bid received and rejected, why rejected?			
i. Utilizing this firm? (If yes, more on p. 4)*	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Information Needed For Review	Contact 10	Contact 11	Contact 12
a. Name of Firm Contacted			
b. Contact's Phone Number			
c. Firm Type	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA
d. Is firm self-certified or agency-certified?	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____
e. Date Contacted			
f. Result of contact			
g. Bid received?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
h. If bid received and rejected, why rejected?			
i. Utilizing this firm? (If yes, more on p. 4)*	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Information Needed For Review	Contact 13	Contact 14	Contact 15
a. Name of Firm Contacted			
b. Contact's Phone Number			
c. Firm Type	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA
d. Is firm self-certified or agency-certified?	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____
e. Date Contacted			
f. Result of contact			
g. Bid received?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
h. If bid received and rejected, why rejected?			
i. Utilizing this firm? (If yes, more on p. 4)*	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Information Needed For Review	Contact 16	Contact 17	Contact 18
a. Name of Firm Contacted			
b. Contact's Phone Number			
c. Firm Type	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA	☐ MBE ☐ WBE ☐ SBRA
d. Is firm self-certified or agency-certified?	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____	☐ Self ☐ Agency (Provide Agency Name) _____
e. Date Contacted			
f. Result of contact			
g. Bid received?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
h. If bid received and rejected, why rejected?			
i. Utilizing this firm? (If yes, more on p. 4)*	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Information on Utilized Firms (Utilized firms that are self-certified must submit a Self-Certification form [Form 8700-295 for MBEs, Form 8700-296 for WBEs])

Business Name	Street Address	City, State, Zip	Type of Product or Service	Subcontract Amount

If Bidder is:

An Individual

Name (typed or printed): _____

By: _____ (SEAL)
(Individual's signature)
Doing business as: _____
Business address: _____
_____
Phone No.: _____ FAX No.: _____

A Partnership

Partnership Name: _____ (SEAL)

By: _____
(Signature of general partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Business address: _____
_____
Phone No.: _____ FAX No.: _____

A Corporation

Corporation Name: _____ (SEAL)
State of Incorporation: _____
Type (General Business, Professional, Service, Limited Liability):_____

By: _____
(Signature -- attach evidence of authority to sign)
Name (typed or printed): _____

Title: _ (CORPORATE SEAL)

Attest _____
(Signature of Corporate Secretary)

Business address: _____
_____
Phone No.: _____ FAX No.: _____

Date of Qualification to do business is _____.

A Joint Venture

Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Business address: _____
_____

Phone No.: _____ FAX No.: _____

Joint Venturer Name: _____ (SEAL)

By: _____
(Signature -- attach evidence of authority to sign)

Name (typed or printed): _____
Title: _____
Business address: _____
_____

Phone No.: _____ FAX No.: _____

Phone and FAX Number, and Address for receipt of official communications:

_____

_____

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

ATTACHMENT 4-B: LOBBYING CERTIFICATION FOR CONTRACTS, GRANTS, LOANS & COOPERATIVE AGREEMENTS

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No federally appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.

2. If any funds other than federally appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this federal contract, grant, loan, or cooperative agreement, the undersigned shall complete Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

3. The undersigned shall require that the language of this CERTIFICATION be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This CERTIFICATION is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this CERTIFICATION is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required CERTIFICATION shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

_____ _____

(Signature of Chief Executive Officer) *(Date)*

_____

(Name of Business/Firm)

ATTACHMENT 4-14: SUBCONTRACTOR ELIGIBILITY

Name of firm_____

Business address_____

Home address_____

Business phone_____

Home phone_____

Social Security number_____

Amount of your subcontract on this project $_____

Sole Proprietor_____ Partnership_____Corporation_____

Describe your work on this project:_____

_____

Who pays for the building materials you use?_____

Is your work "labor only" service?_____

Do you provide your own tools on this project?_____

If not, who does?_____

Are you paid by Lump Sum_____ Amount $_____

By the hour_____ Amount per hour $_____

Piece work_____ How much $_____

Is this your first subcontract?____ If not, list other construction projects you have worked on as a contractor or subcontractor:_____

_____

_____

On this project do you expect to hire or employ anyone else to work for you in completing your work?

_____

On previous projects as a subcontractor have you hired anyone else to work for you?

_____

If this is your first subcontract, for whom did you previously work just prior to your work on this project?

_____

Do you carry liability insurance?_____

Are you employed by any other firm while you are working on this project?_____

Name of firm_

What deductions from the gross amount of your subcontract are made?_____

Federal or state taxes_____ By whom_____

Social Security taxes_____ By whom_____

Other deductions_____ By whom_____

_____
(Signature)

_____
(Title)

_____
(Date)

UNIT PRICE BID SCHEDULE
OAK CREEK WATER AND SEWER UTILITY
PART B--TRANSMISSION MAIN CONSTRUCTION
MILWAUKEE COUNTY, WISCONSIN

PUETZ ROAD BOOSTER STATION
CONTRACT NO. 4931-09-01

WATER MAIN

Item	Description	Unit Price	Total Price
1.	486 lineal feet of 20-inch diameter ductile iron water main, thickness Class 52, including all required fittings, connections to existing mains and all required restoration, for the unit price of:		
	_____ (DOLLARS PER LINEAL FOOT)	$_____	$_____
2.	226 lineal feet of 24-inch diameter ductile iron water main, thickness Class 52, including all required connections to existing mains and all required restoration, for the unit price of:		
	_____ (DOLLARS PER LINEAL FOOT)	$_____	$_____
3.	2 each of 20-inch diameter butterfly valve and value box and all required restoration, for the unit price of:		
	_____ (DOLLARS PER EACH)	$_____	$_____
4.	3 each of 24-inch diameter butterfly valve and valve box, and all required restoration, for the unit price of:		
	_____ (DOLLARS PER EACH)	$_____	$_____
5.	1 each of 16-inch diameter butterfly valve, value box, and all required restoration, for the unit price of:		
	_____ (DOLLARS PER EACH)	$_____	$_____

WATER MAIN--CONTINUED

Item	Description	Unit Price	Total Price
6.	1 each of 6-inch diameter gate valve, valve box, and all required restoration, for the unit price of:		
	_____ (DOLLARS PER EACH)	$_____	$_____
7.	1 each of furnish and install hydrants, including removal and disposal of existing hydrants, all required fittings, bends, thrust restraint, and appurtenances, for the unit price of:		
	_____ (DOLLARS PER EACH)	$_____	$_____
8.	12 lineal foot of 6-inch ductile iron hydrant lead, including all required tees, crosses, bends, adaptors, plugs, tracer wire, and connections to existing mains, for the unit price of:		
	_____ (DOLLARS PER LINEAL FOOT)	$_____	$_____
9.	120 lineal feet of 4-inch diameter, Schedule 40 sanitary sewer lateral, including all fittings, cleanouts, and connections, for the unit price of:		
	_____ (DOLLARS PER LINEAL FOOT)	$_____	$_____
	TOTAL—Water Main, Items 1-9		$_____

REQUIRED SUPPLEMENTAL BID ITEMS

Item	Description	Unit Price	Total Price
10.	Provide an add/deduct for the following: All iron, steel and manufactured goods incorporated in the project shall be produced as per requirements in specification section American Recovery and Reinvestment Act (ARRA) "Federal Stimulus Package" special requirements.		
	_____ (ADD/DEDUCT LUMP SUM)	$_____	$_____
11.	Provide an add/deduct for complying with Davis Bacon wage rates.		
	_____ (ADD/DEDUCT LUMP SUM)	$_____	$_____
	TOTAL—Miscellaneous, Items 10-11		$_____
	TOTAL—CONTRACT 4931-09-01, PART B, ITEMS 1-11		$

SECTION 00431

BASE BID, SUBSTITUTE, AND "OR EQUALS" SCHEDULE

At the time of bid, Bidder shall identify one or more proposed "or equals" and/or substitutes meeting the requirements of paragraph 6.05 of the General Conditions for the following items identifying the comparative cost with the specified "named" item. The purpose of this schedule is to identify any proposed substitute and "or equals" for these specific items.

If Engineer and Owner believe consideration of the proposed items will result in a cost savings, then the apparent low bidder shall submit sufficient information for evaluation; in accordance with paragraph 6.05 of the General Conditions.

Note: Contractor SHALL circle the named equipment manufacturer being provided under the base bid.

PUETZ ROAD BOOSTER STATION
PART B — TRANSMISSION MAIN CONSTRUCTION
CONTRACT NO. 4931-09-01

Specification Section	Named Equipment	Proposed Substitute "Or Equal"	Base Bid Price Adjustment	
			Add To	Deduct From
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$

SECTION 00432

TABULATION OF SUBCONTRACTORS

The following subcontractors will be utilized for portions of the project work. Changes shall not be made subsequent to the bid unless the change(s) is approved by the Owner.

PUETZ ROAD BOOSTER STATION
PART B — TRANSMISSION MAIN CONSTRUCTION
CONTRACT NO. 4931-09-01

Subcontractor	Classification of Work	Estimated Dollar Amount
	Asphalt	
	Trucking	
	Landscaping	

SECTION 00435

BID BOND

BIDDER (Name and Address):

_____

_____

_____

SURETY (Name and Address of Principal Place of Business):

_____

_____

_____

OWNER (Name and Address):

OAK CREEK WATER AND SEWER UTILITY
170 WEST DREXEL AVENUE
OAK CREEK, WI 53154

BID

BID DUE DATE: _____

PROJECT (Brief Description Including Location):

Part B – Transmission Main Construction; Contract 4931-09-01

BOND

BOND NUMBER: _____

DATE (Not later than Bid due date): _____

PENAL SUM: _____ _____

(Words) (Figures)

IN WITNESS WHEREOF, Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

BIDDER	SURETY
_____ (Seal)	_____ (Seal)
Bidder's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature and Title	Signature and Title (Attach Power of Attorney)
Attest: _____	Attest: _____
Signature and Title	Signature and Title

Note: (1) Above addresses are to be used for giving required notice.

(2) Any singular reference to Bidder, Surety, OWNER or other party shall be considered plural where applicable.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to OWNER upon default of Bidder the penal sum set forth on the face of this Bond.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment Bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

3.1. OWNER accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment Bonds required by the Bidding Documents, or

3.2. All Bids are rejected by OWNER, or

3.3. OWNER fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from OWNER, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of and any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by OWNER and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power or Attorney evidencing the authority of the officer, agent or representative who executed this Bond on behalf of Surety to execute, seal and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer or proposal as applicable.

OWNER'S REPRESENTATIVES:

Robert E. Lee & Associates, Inc.
4664 Golden Pond Park Court
Hobart, WI 54155
(920) 662-9641
(920) 662-9141 (Fax)

AGENT OR BROKER:

Name: _____

Address: _____

Phone: _____

Fax: _____

Section C-510
Notice of Award

Date: _____

Project: Puetz Road Booster Station; Part B--Transmission Main Construction

Owner: OAK CREEK WATER AND SEWER UTILITY	Owner's Contract No.: 4931-09-01
Contract: 4931-09-01	Engineer's Project No.: 4931-001
Bidder:	
Bidder's Address: *[send Notice of Award Certified Mail, Return Receipt Requested]*	

You are notified that your Bid dated _____ for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for _____

[Indicate total Work, alternates, or sections of Work awarded.]

The Contract Price of your Contract is _____ Dollars ($_____).

[Insert appropriate data if unit prices are used. Change language for cost-plus contracts.]

_____ copies of the proposed Contract Documents (except Drawings) accompany this Notice of Award.

_____ sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within [15] days of the date you receive this Notice of Award.

1. Deliver to the Owner [_____] fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Contract security [Bonds] as specified in the Instructions to Bidders (Article 20), General Conditions (Paragraph 5.01), and Supplementary Conditions (Paragraph SC-5.01).
3. Other conditions precedent:

   _____

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Contract Documents.

OAK CREEK WATER AND SEWER UTILITY
Owner

By: _____
Authorized Signature

_____
Title

Copy to Engineer

SECTION 00520
STANDARD FORM OF AGREEMENT
BETWEEN OWNER AND CONTRACTOR
ON THE BASIS OF A STIPULATED PRICE

THIS AGREEMENT is by and between OAK CREEK WATER AND SEWER UTILITY

(hereinafter called OWNER) and _____

(hereinafter called CONTRACTOR).

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1 - WORK

1.01 CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

Puetz Road Booster Station; Contract No. 4931-09-01
Part B--Transmission Main Construction

ARTICLE 2 - THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Puetz Road Booster Station; Contract No. 4931-09-01
Part B--Transmission Main Construction

ARTICLE 3 - ENGINEER

3.01 The Project has been designed by Robert E. Lee & Associates, Inc., who is hereinafter called ENGINEER and who is to act as OWNER's representative, assume all duties and responsibilities, and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 - CONTRACT TIMES

4.01 Time of the Essence

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 Days to Achieve Substantial Completion and Final Payment

A. **Part B--Transmission Main Construction.** The Work will be substantially completed within 90 days after the date when the Contract Times commence to run as provided in paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with paragraph 14.07 of the General Conditions within 120 days after the date when the Contract Times commence to run.

4.03 Liquidated Damages

A. CONTRACTOR and OWNER recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty), CONTRACTOR shall pay OWNER **$1,000** each day that expires after the time specified in paragraph 4.02 for Substantial Completion until the Work is substantially complete. After Substantial Completion, if CONTRACTOR shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER **$500** for each day that expires after the time specified in paragraph 4.02 for Final Completion and readiness for final payment until the Work is completed and ready for final payment. The owner reserves the right to deduct the amount of the liquidated damages from the final payment or retainage.

ARTICLE 5 - CONTRACT PRICE

5.01 OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to paragraphs 5.01.A, 5.01.B, and 5.01.C below:

A. For all Work other than Unit Price Work, a Lump Sum of:

_____

_____ (words)

_____ (figure)

All specific cash allowance, if applicable, are included in the above price and have been computed in accordance with paragraph 11.02 of the General Conditions.

B. For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of that item as indicated in this paragraph:

_____

_____ (words)

_____ (figure)

As provided in paragraph 11.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by ENGINEER as provided in paragraph 9.08 of the General Conditions. Unit prices have been computed as provided in paragraph 11.03 of the General Conditions.

C. For all Work, at the prices stated in CONTRACTOR's Bid, attached hereto as an exhibit.

ARTICLE 6 - PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

A. CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

6.02 Progress Payments; Retainage

A. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment on or ***before*** the **1st day of each month** during performance of the Work as provided in paragraphs 6.02.A.1 and 6.02.A.2 below. ***If the application for payment is not received by the date specified, the payment shall be delayed to the next scheduled approval date.*** All such payments will be measured by the schedule of values established in paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements:

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as ENGINEER may determine or OWNER may withhold, in accordance with paragraph 14.02 of the General Conditions:

    a. 95% of Work completed (with the balance being retainage). When the Work has been 50% completed as determined by ENGINEER, and if the character and progress of the Work have been satisfactory to OWNER and ENGINEER, OWNER, on recommendation of ENGINEER, may determine that as long as the character and progress of the Work remain satisfactory to them, there will be no retainage on account of Work subsequently completed, in which case the remaining progress payments prior to Substantial Completion will be in an amount equal to 100% of the Work completed less the aggregate of payments previously made; and

2. Upon Substantial Completion, OWNER shall pay an amount sufficient to increase total payments to CONTRACTOR to 95% of the Work completed, less such amounts as ENGINEER shall determine in accordance with paragraph 14.02.B.5 of the General Conditions.

6.03 Final Payment

A. Upon final completion and acceptance of the Work in accordance with paragraph 14.07 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said paragraph 14.07.

ARTICLE 7 - INTEREST

7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at a rate equal to the daily prime lending rate as published in the Wall Street Journal plus 1.5%.

ARTICLE 8 - CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce OWNER to enter into this Agreement CONTRACTOR makes the following representations:

A. CONTRACTOR has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. CONTRACTOR has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. CONTRACTOR is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. CONTRACTOR has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions and (2) reports and drawings of a Hazardous Environmental Condition, if any, at the Site which has been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions.

E. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR, including applying the specific means, methods, techniques, sequences, and procedures of construction, if any, expressly required by the Contract Documents to be employed by CONTRACTOR, and safety precautions and programs incident thereto

F. CONTRACTOR does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

G. CONTRACTOR is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Contract Documents.

H. CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

I. CONTRACTOR has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that CONTRACTOR has discovered in the Contract Documents, and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

J. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 9 - CONTRACT DOCUMENTS

9.01 Contents of Contract Documents

A. The Contract Documents consist of the following:

1. This Agreement (pages 00520RD-1 to 00520RD-8, inclusive);

2. Performance Bond (pages C-610-1 to C-610-4, inclusive);

3. Payment Bond (pages C-615-1 to C-615-3, inclusive);

4. Bid Bond (pages 00435-1 to 00435-3, inclusive);

5. Other Bonds (pages _____ to _____, inclusive);

   a. _____ (pages _____ to _____, inclusive);

   b. _____ (pages _____ to _____, inclusive);

   c. _____ (pages _____ to _____, inclusive);

6. General Conditions (pages C-710-1 to C-710-57, inclusive);

7. Supplementary Conditions (pages 00800RD-1 to 00800RD-7, inclusive);

8. Specifications as listed in the table of contents of the Project Manual;

9. Drawings consisting of a cover sheet and sheets numbered 1 through 53, inclusive, with each sheet bearing the following general title: Oak Creek Water and Sewer Utility; Milwaukee County, Wisconsin; Puetz Road Booster Station; Contract A—Booster Station Construction and Contract B Transmission Main Construction;

10. Addenda (numbers _____ to _____, inclusive);

11. Exhibits to this Agreement (enumerated as follows):

a. Notice to Proceed (pages 00550-1 to 00550-1, inclusive);

b. CONTRACTOR's Bid (pages 00410-1 to 00410-19, inclusive);

c. Documentation submitted by CONTRACTOR prior to Notice of Award (pages 00410-1 to 00435-3, inclusive);

12. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:

a. Written Amendments;

b. Work Change Directives;

c. Change Order(s).

B. The documents listed in paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 9.

D. The Contract Documents may only be amended, modified, or supplemented as provided in paragraph 3.05 of the General Conditions.

9.02 Legal Documents

A. The legal documents are a subset of the contract documents which form the Agreement for services by and between the Owner and Contractor.

B. The legal documents consist of the following:
1. Notice of Award (Pages C-510-1 to C-510-1, inclusive).

2. This Agreement (Pages 00520RD-1 to 00520RD-8, inclusive).

ARTICLE 10 - MISCELLANEOUS

10.01 Terms

A. Terms used in this Agreement will have the meanings indicated in the General Conditions.

10.02 Assignment of Contract

A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment

will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 Successors and Assigns

A. OWNER and CONTRACTOR each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 Severability

A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon OWNER and CONTRACTOR, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in duplicate. One counterpart each has been delivered to OWNER and CONTRACTOR. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or on their behalf.

This Agreement will be effective on _____ (which is the Effective Date of the Agreement).

OWNER:
OAK CREEK WATER AND SEWER UTILITY

By: _____

[CORPORATE SEAL]

Attest _

Address for giving notices:
Oak Creek Water And Sewer Utility
170 West Drexel Avenue
Oak Creek, WI 53154

(If OWNER is a corporation, attach evidence of authority to sign. If OWNER is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of OWNER-CONTRACTOR Agreement.)

Designated Representative:

Name: Mike Sullivan

Title: Utility Engineer

Address: 170 West Drexel Avenue
Oak Creek, WI 53154

Phone: 1-414-570-8210

Facsimile: 1-414-570-8215

CONTRACTOR:
_____

By: _____

[CORPORATE SEAL]

Attest _

Address for giving notices:
_____
_____
_____

License No. _____
(Where applicable)

Agent for service of process: _____

(If CONTRACTOR is a corporation or a partnership, attach evidence of authority to sign.)

Designated Representative:

Name: _____

Title: _____

Address: _____
_____

Phone: _____

Facsimile: _____

AGENCY CONCURRENCE:

As lender or insurer of funds to defray the costs of this contract, and without liability for any payments thereunder, the Agency here by concurs in the form, content, and execution of this agreement.

By: _____

Title: _____

Date: _____

SECTION 00550
NOTICE TO PROCEED

Dated _____

TO: _____
(CONTRACTOR)

ADDRESS: _____

_____

Contract: 4931-09-01

Project: PUETZ ROAD BOOSTER STATION
PART B--TRANSMISSION MAIN CONSTRUCTION

You are notified that the Contract Times under the above contract will commence to run on _____ _____. By that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Agreement the date of Substantial Completion is _____ and the date of readiness for final payment is _____.

Before you may start any Work at the Site, paragraph 2.05.C of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must

_____

_____

_____

OAK CREEK WATER AND SEWER UTILITY
(OWNER)

By: _____
(AUTHORIZED SIGNATURE)

_____
(TITLE)

Copy to ENGINEER

Acceptance of Notice: Receipt of the above Notice to Proceed is hereby acknowledged by:

_____ _____
(CONTRACTOR REPRESENTATIVE) (DATE)

_____
(TITLE)

SECTION 00555

REQUEST FOR INTERPRETATION

ROBERT E. LEE & ASSOCIATES, INC.
4664 Golden Pond Park Court
Hobart, WI 54155
Telephone: (920) 662-9641
Fax: (920) 662-9141

NAME: _____

COMPANY: _____

ADDRESS: _____

TELEPHONE _____ FAX: _____

_____ Contractor _____ Subcontractor _____ Vendor

RE: _____ Specification Section _____ Page _____

_____ Plan Sheet/Drawing _____ Section/Detail _____

QUESTION: _____

_____

_____

_____

_____

_____

INTERPRETATION (For Engineer Use): _____

_____

_____

_____

_____

_____

- END OF SECTION -

SECTION 00560

WORK CHANGE DIRECTIVE

No. _____

Owner: OAK CREEK WATER AND SEWER UTILITY

Robert E. Lee & Associates, Inc. 4931-001
Project No. _____

Project: Puetz Road Booster Station
Part B--Transmission Main Construction

Contract No. 4931-09-01

Date of Issuance: _____

You are directed to proceed with the following change(s):

Description:

Purpose of Work Change Directive:

Attachments:

If Owner or Contractor believe that the above change has affected Contract Price, any Claim for a Change Order based thereon will involve one or more of the following methods as defined in the Contract Documents.

Method of determining change in Contract Price:

- ☐ Lump Sum
- ☐ Unit Prices
- ☐ Cost of the Work

Estimated increase (decrease) in Contract Price:

$ _____

Estimated increase (decrease) in Contract Times:

Substantial Completion: ___ days;
Ready for final payment: ___ days.

If the change involves an increase, the estimated amount is not to be exceeded without further authorization.

Acknowledged:

By: _____
Robert E. Lee & Associates, Inc.

Date: _____

Approved:

By: _____
Owner - Oak Creek Water And Sewer Utility

Date: _____

CC:

OWNER COPY
ENGINEER COPY
CONTRACTOR COPY
FILE COPY

SECTION 00572

FIELD ORDER FORM
ITEM NO. _____

OWNER OAK CREEK WATER AND SEWER UTILITY

PROJECT PUETZ ROAD BOOSTER STATION;
PART B--TRANSMISSION MAIN CONSTRUCTION

CONTRACTOR _____

CONTRACT NO. 4931-09-01

DATE _____

THIS CHANGE IS REQUESTED BY _____

DESCRIPTION OF ORDER: _____

Refer to Drawing Sheets _____ Section or Detail _____

Refer to Specification Paragraphs _____

Will additional drawings be necessary? Yes [ ] No [ ]

It is understood and mutually agreed that this form is to be used only to record minor orders which do not increase or decrease the contract price or change the intent of a specific provision of the contract. Any orders involving change to the contract price or contract requirements must be covered by a formal change order executed by the Owner and the Contractor.

FOR ROBERT E. LEE & ASSOCIATES	FOR CONTRACTOR	FOR OAK CREEK WATER AND SEWER UTILITY
_____	_____	_____
Date _____	Date _____	Date _____

SECTION C-610
PERFORMANCE BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):
OAK CREEK WATER AND SEWER UTILITY
170 West Drexel Avenue
Oak Creek, WI 53154

CONTRACT
Effective Date of Agreement:
Amount:
Description (*Name and Location*): Puetz Road Booster Station; Contract No. 4931-09-01
Part B--Transmission Main Construction

BOND
Bond Number:
Date (*Not earlier than Effective Date of Agreement*):
Amount:
Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

_____ (Seal)
Contractor's Name and Corporate Seal

By: _____
Signature

_____
Print Name

_____
Title

Attest: _____
Signature

_____
Title

SURETY

_____ (Seal)
Surety's Name and Corporate Seal

By: _____
Signature (Attach Power of Attorney)

_____
Print Name

_____
Title

Attest: _____
Signature

_____
Title

Note: Provide execution by additional parties, such as joint venturers, if necessary.

Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner for the performance of the Contract, which is incorporated herein by reference.

1. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 2.1.

2. If there is no Owner Default, Surety's obligation under this Bond shall arise after:
   2.1 Owner has notified Contractor and Surety, at the addresses described in Paragraph 9 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor, and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and
   2.2 Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 2.1; and
   2.3 Owner has agreed to pay the Balance of the Contract Price to:
      1. Surety in accordance with the terms of the Contract; or
      2. Another contractor selected pursuant to Paragraph 3.3 to perform the Contract.

3. When Owner has satisfied the conditions of Paragraph 2, Surety shall promptly, and at Surety's expense, take one of the following actions:

   3.1 Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or
   3.2 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
   3.3 Obtain bids or negotiated proposals from qualified contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 5 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or
   3.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:
      1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or
      2. Deny liability in whole or in part and notify Owner citing reasons therefor.

4. If Surety does not proceed as provided in Paragraph 3 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 3.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.

5. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 3.1, 3.2, or 3.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To the limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

5.1 The responsibilities of Contractor for correction of defective Work and completion of the Contract;
5.2 Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions of or failure to act of Surety under Paragraph 3; and
5.3 Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.

6. Surety shall not be liable to Owner or others for obligations of Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than Owner or its heirs, executors, administrators, or successors.

7. Surety hereby waives notice of any change, including changes of time, to Contract or to related subcontracts, purchase orders, and other obligations.

8. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located, and shall be instituted within two years after Contractor Default or within two years after Contractor ceased working or within two years after Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

9. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.

10. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

11. Definitions.

11.1 Balance of the Contract Price: The total amount payable by Owner to Contractor under the Contract after all proper adjustments have been made, including allowance to Contractor of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Contractor is entitled, reduced by all valid and proper payments made to or on behalf of Contractor under the Contract.
11.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
11.3 Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
11.4 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – (*Name, Address and Telephone*)
Surety Agency or Broker:
Owner's Representative (*Engineer or other party*): Robert E. Lee & Associates, Inc.
(Kimberly Kimmes, Project Manager)
4664 Golden Pond Park Court
Hobart, WI 54155

SECTION C-615A
PAYMENT BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):
OAK CREEK WATER AND SEWER UTILITY
170 West Drexel Avenue
Oak Creek, WI 53154

CONTRACT
Effective Date of Agreement:
Amount:
Description *(Name and Location)*: Puetz Road Booster Station; Contract No. 4931-09-01
Part B--Transmission Main Construction

BOND
Bond Number:
Date (*Not earlier than Effective Date of Agreement*):
Amount:
Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL	**SURETY**
_____ (Seal)	_____ (Seal)
Contractor's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature	Signature (Attach Power of Attorney)
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	Attest: _____
Signature	Signature
_____	_____
Title	Title

Note: Provide execution by additional parties, such as joint venturers, if necessary.

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.

2. With respect to Owner, this obligation shall be null and void if Contractor:

2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and

2.2 Defends, indemnifies, and holds harmless Owner from all claims, demands, liens, or suits alleging non-payment by Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided Owner has promptly notified Contractor and Surety (at the addresses described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to Contractor and Surety, and provided there is no Owner Default.

3. With respect to Claimants, this obligation shall be null and void if Contractor promptly makes payment, directly or indirectly, for all sums due.

4. Surety shall have no obligation to Claimants under this Bond until:

4.1 Claimants who are employed by or have a direct contract with Contractor have given notice to Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

4.2 Claimants who do not have a direct contract with Contractor:

1. Have furnished written notice to Contractor and sent a copy, or notice thereof, to Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and
2. Have either received a rejection in whole or in part from Contractor, or not received within 30 days of furnishing the above notice any communication from Contractor by which Contractor had indicated the claim will be paid directly or indirectly; and
3. Not having been paid within the above 30 days, have sent a written notice to Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to Contractor.

5. If a notice by a Claimant required by Paragraph 4 is provided by Owner to Contractor or to Surety, that is sufficient compliance.

6. Reserved

7. Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by Surety.

8. Amounts owed by Owner to Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By Contractor furnishing and Owner accepting this Bond, they agree that all funds earned by Contractor in the performance of the Contract are dedicated to satisfy obligations of Contractor and Surety under this Bond, subject to Owner's priority to use the funds for the completion of the Work.

9. Surety shall not be liable to Owner, Claimants, or others for obligations of Contractor that are unrelated to the Contract. Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

10. Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders, and other obligations.

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, Owner, or Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. Definitions

15.1 Claimant: An individual or entity having a direct contract with Contractor, or with a first-tier subcontractor of Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of Contractor and Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

15.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

15.3 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract, or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – (*Name, Address, and Telephone*)
Surety Agency or Broker:
Owner's Representative (*Engineer or other*):
Robert E. Lee & Associates, Inc. (Kimberly Kimmes, Project Manager)
4664 Golden Pond Park Court
Hobart, WI 54155
(920)662-9641

SECTION C-620
APPLICATION FOR PAYMENT

Contractor's Application for Payment No.

	Application Period:	Application Date:
To (Owner): Oak Creek Water and Sewer Utility	From (Contractor):	Via (Engineer): Robert E. Lee & Associates, Inc.
Project: Puetz Road Booster Station--Part B Transmission Main Construction	Contract: 4931-09-01	
Owner's Contract No.: 4931-09-01	Contractor's Project No.:	Engineer's Project No.: 4931-001

Application For Payment

Change Order Summary

Approved Change Orders		
Number	Additions	Deductions
TOTALS		
NET CHANGE BY CHANGE ORDERS		

1. **ORIGINAL CONTRACT PRICE**..... $ _____
2. **Net change by Change Orders**..... $ _____
3. **Current Contract Price (Line 1 ± 2)**..... $ _____
4. **TOTAL COMPLETED AND STORED TO DATE (Column F on Progress Estimate)**..... $ _____
5. **RETAINAGE:**
   - a. X _____ **Work Completed**..... $ _____
   - b. X _____ **Stored Material**..... $ _____
   - c. **Total Retainage (Line 5a + Line 5b)**..... $ _____
6. **AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c)**..... $ _____
7. **LESS PREVIOUS PAYMENTS (Line 6 from prior Application)**..... $ _____
8. **AMOUNT DUE THIS APPLICATION**..... $ _____
9. **BALANCE TO FINISH, PLUS RETAINAGE (Column G on Progress Estimate + Line 5 above)**..... $ _____

Contractor's Certification

The undersigned Contractor certifies that to the best of its knowledge: (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Applications for Payment; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to Owner indemnifying Owner against any such Liens, security interest or encumbrances); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

By:	Date:

Payment of: $ _____
(Line 8 or other - attach explanation of the other amount)

is recommended by: _____ _____
(Engineer) (Date)

Payment of: $ _____
(Line 8 or other - attach explanation of the other amount)

is approved by: _____ _____
(Owner) (Date)

Approved by: _____ _____
Funding Agency (if applicable) (Date)

Endorsed by the Construction Specifications Institute.

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Progress Estimate

Contractor's Application

For (contract): 4931-09-01	Application Number:
Application Period:	Application Date:

A		B	Work Completed		E	F		G
Item			C	D				
Specification Section No.	Description	Scheduled Value	From Previous Application (C+D)	This Period	Materials Presently Stored (not in C or D)	Total Completed and Stored to Date (C + D + E)	% (F) B	Balance to Finish (B - F)
	Totals							

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Progress Estimate

Contractor's Application

For (contract): 4931-09-01							Application Number:			
Application Period:							Application Date:			
A				B	C	D	E	F		
Item		Bid Quantity	Unit Price	Bid Value	Estimated Quantity Installed	Value	Materials Presently Stored (not in C)	Total Completed and Stored to Date (D + E)	% (F) B	Balance to Finish (B - F)
Bid Item No.	Description									
	Totals									

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Stored Material Summary

Contractor's Application

For (contract): 4931-09-01							Application Number:		
Application Period:							Application Date:		
A	B	C	D		E		F		G
Invoice No.	Shop Drawing Transmittal No.	Materials Description	Stored Previously		Stored this Month		Incorporated in Work		Materials Remaining in Storage ($) (D + E - F)
			Date (Month/Year)	Amount ($)	Amount ($)	Subtotal	Date (Month/Year)	Amount ($)	
		Totals							

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OWNER COPY
ENGINEER COPY
CONTRACTOR COPY
FILE COPY

SECTION 00625

CERTIFICATE OF SUBSTANTIAL COMPLETION

DATE OF ISSUANCE _____

OWNER OAK CREEK WATER AND SEWER UTILITY
CONTRACTOR _____
Contract: 4931-09-01
Project: Puetz Road Booster Station
Part B--Transmission Main Construction

This Certificate of Substantial Completion applies to all Work under the Contract Documents or to the following specified parts thereof:

To OAK CREEK WATER AND SEWER UTILITY
OWNER

And To _____
CONTRACTOR

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR and ENGINEER, and that Work is hereby declared to be substantially complete in accordance with the Contract Documents on

_____
DATE OF SUBSTANTIAL COMPLETION

A tentative list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include an item in it does not alter the responsibility of CONTRACTOR to complete all the Work in accordance with the Contract Documents. The items in the tentative list shall be completed or corrected by CONTRACTOR within _____ days of the above date of Substantial Completion.

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties and guarantees shall be as follows:

OWNER:_____

_____

_____

CONTRACTOR:_____

_____

_____

_____

The following documents are attached to and made a part of this Certificate:

_____

This certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of CONTRACTOR's obligation to complete the Work in accordance with the Contract Documents.

_____

Executed by ENGINEER on _____
Date

ROBERT E. LEE & ASSOCIATES, INC.
ENGINEER

By: _____
(Authorized Signature)

CONTRACTOR accepts this Certificate of Substantial Completion on _____
Date

_____
CONTRACTOR

By: _____
(Authorized Signature)

OWNER accepts this Certificate of Substantial Completion on _____
Date

OAK CREEK WATER AND SEWER UTILITY
OWNER

By: _____
(Authorized Signature)

OWNER COPY
ENGINEER COPY
CONTRACTOR COPY
FILE COPY

SECTION 00628

CERTIFICATE OF FINAL COMPLETION

DATE OF ISSUANCE _____

OWNER OAK CREEK WATER AND SEWER UTILITY
CONTRACTOR _____
Contract: 4931-09-01
Project: Puetz Road Booster Station
Part B--Transmission Main Construction

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR and ENGINEER, and that Work is hereby declared to be completed in accordance with the Contract Documents on

_____
DATE OF FINAL COMPLETION

Executed by ENGINEER on _____
Date

ROBERT E. LEE & ASSOCIATES, INC.
ENGINEER

By: _____
(Authorized Signature)

CONTRACTOR accepts this Certificate of Final Completion on _____
Date

_____
CONTRACTOR

By: _____
(Authorized Signature)

OWNER accepts this Certificate of Final Completion on _____
Date

OAK CREEK WATER AND SEWER UTILITY
OWNER

By: _____
(Authorized Signature)

OWNER COPY
ENGINEER COPY
CONTRACTOR COPY
FILE COPY

SECTION 00626

STATEMENT OF SURETY COMPANY

IN ACCORDANCE with the provisions of the CONTRACT dated _____

_____ between the _____

OAK CREEK WATER AND SEWER UTILITY
(OWNER)

and _____
(CONTRACTOR)

the _____
(SURETY)

SURETY on the Material and Labor Payment BOND of _____

_____

after a careful examination of the books and records of said CONTRACTOR or after receipt of an affidavit from CONTRACTOR, which examination of affidavit satisfies SURETY that all claims for labor and materials have been satisfactorily settled, hereby approves of the final payment of the said _____
(CONTRACTOR)

and by these presents witnesseth that payment to the CONTRACTOR of the final estimates shall not relieve SURETY of any of its obligations to _____
_____, as set forth in the said SURETY COMPANY'S BOND.

IN WITNESS WHEREOF, said SURETY has hereunto set its hand and seal this _____ day of _____, 20___.

Attest:

(Seal) _____ By: _____
President

_____

Note: This statement, if executed by any person other than the President or Vice-President of the Company, must be accompanied by a certificate of even date showing authority conferred upon the person so signing to execute such instruments on behalf of the Company represented.

OWNER COPY
ENGINEER COPY
CONTRACTOR COPY
FILE COPY

SECTION 00628

CERTIFICATE OF FINAL COMPLETION

DATE OF ISSUANCE _____

OWNER OAK CREEK WATER AND SEWER UTILITY
CONTRACTOR _____
Contract: 4931-09-01
Project: Puetz Road Booster Station
Part B--Transmission Main Construction

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR and ENGINEER, and that Work is hereby declared to be completed in accordance with the Contract Documents on

_____
DATE OF FINAL COMPLETION

Executed by ENGINEER on _____
Date

ROBERT E. LEE & ASSOCIATES, INC.
ENGINEER

By: _____
(Authorized Signature)

CONTRACTOR accepts this Certificate of Final Completion on _____
Date

_____
CONTRACTOR

By: _____
(Authorized Signature)

OWNER accepts this Certificate of Final Completion on _____
Date

OAK CREEK WATER AND SEWER UTILITY
OWNER

By: _____
(Authorized Signature)

OWNER COPY
ENGINEER COPY
CONTRACTOR COPY
FILE COPY

SECTION 00630

CONTRACTOR'S AFFIDAVIT

STATE OF: _____

COUNTY OF: _____

Before me, the undersigned, a _____
(Notary Public, Justice of the Peace, or Alderman)

in and for said County and State personally appeared _____
(Individual, Partner, or duly authorized

_____
representative of Corporate CONTRACTOR)

who being duly sworn according to law deposes and says that all labor, material, and outstanding claims and indebtedness of whatever nature arising out of the performance of the CONTRACT of the _____

OAK CREEK WATER AND SEWER UTILITY
(OWNER)

with _____ have been paid in full.

_____
(Individual, Partner, or duly authorized
representative of Corporate CONTRACTOR)

Sworn to an subscribed before me this_____ day of _____, 20____.

_____
Notary Public (Seal)

Commission expires: _____

OWNER COPY
ENGINEER COPY
CONTRACTOR COPY
FILE COPY

SECTION 00635

CONTRACTOR'S RELEASE

KNOW ALL MEN BY THESE PRESENTS THAT: _____

_____
(CONTRACTOR)

of _____ County and State of _____ does hereby acknowledge that

he has received this day of an from the OAK CREEK WATER AND SEWER UTILITY
(OWNER)

the sum of One Dollar ($1.00) and other valuable consideration in full satisfaction and payment of all sums of money owing, payable and belonging to _____

_____
(CONTRACTOR)

by any means whatsoever, for on account of a certain agreement hereinafter called the CONTRACT,

between the said OAK CREEK WATER AND SEWER UTILITY
(OWNER)

and _____
(CONTRACTOR)

dated _____.

NOW, THEREFORE, the said _____
(CONTRACTOR)

(for myself, my heirs, executors, and administrators) (for itself, its successors and assigns) do by these presents remise, release quit-claim and forever discharge the said _____

OAK CREEK WATER AND SEWER UTILITY
(OWNER)

its successors and assigns, of and from all claims and demands arising from or in connection with the said CONTRACT dated _____ and of and from all, and all manner of action and actions, cause and causes of action and actions, suits, debts, dues duties, sum and sums of money, accounts, reckonings, bond, bills, specialties, covenants, contracts, agreements, promises, variances, damages, judgments, extents, executions, claims and demand, whatsoever in law or equity, or otherwise which against the said _____

_____
(OWNER)

its successors and assigns ever had, now have, or which (I, my heirs, executors or administrators) (it, its successors and assigns) hereinafter can, shall or may have for upon or by reason of any matter, cause or thing whatsoever, from the beginning of the world to the date of these presents.

IN WITNESS WHEREOF _____
(CONTRACTOR)

has caused these presents to be duly executed the _____ day of _____,20__.

Signed, Sealed, and Delivered
in the presence of:

_____ _____ (Seal)
(Individual)

_____ (Seal)
(Partnership Contractor)

_____ By_____(Seal)
(Partner)

Attest:

_____ (Seal)

_____ By_____(Seal)
(Secretary) (President or Vice-President)

(Corporate Seal)

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the Controlling Law.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT FUNDING AGENCY EDITION

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By

ACEC
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This document has been approved and endorsed by

The Associated General Contractors of America

and the

Construction Specification Institute

Knowledge for Creating and Sustaining the Built Environment

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These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor Funding Agency Edition No. C-521 (2002 Edition). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the EJCDC Construction Documents, General and Instructions (No. C-001, 2002 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. C-800, 2002 Edition).

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GENERAL CONDITIONS

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda* – Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agency* – The Federal or state agency named as such in the Agreement.

3. *Agreement* – The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

4. Application for Payment – The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

5. *Asbestos* – Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

6. *Bid* – The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

7. *Bidder* – The individual or entity who submits a Bid directly to Owner.

8. *Bidding Documents* – The Bidding Requirements and the proposed Contract Documents (including all Addenda).

9. *Bidding Requirements* – The Advertisement or Invitation to Bid, Instructions to Bidders, bid security of acceptable form, if any, and the Bid Form with any supplements.

10. *Change Order* – A document recommended by Engineer which is signed by Contractor and Owner and Agency and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

11. *Claim* – A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

12. *Contract* – The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

13. *Contract Documents* – Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor's submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

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14. *Contract Price* – The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

15. *Contract Times* – The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any, (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

16. *Contractor* – The individual or entity with whom Owner has entered into the Agreement.

17. *Cost of the Work* – See Paragraph 11.01.A for definition.

18. *Drawings* – That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

19. *Effective Date of the Agreement* – The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

20. *Engineer* – The individual or entity named as such in the Agreement.

21. *Field Order* – A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

22. *General Requirements* – Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

23. *Hazardous Environmental Condition* – The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

24. *Hazardous Waste* – The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

25. *Laws and Regulations; Laws or Regulations* – Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

26. *Liens* – Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

27. *Milestone* – A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

28. *Notice of Award* – The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

29. *Notice to Proceed* – A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

30. *Owner* – The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

31. *PCBs* – Polychlorinated biphenyls.

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32. *Petroleum* – Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

33. *Progress Schedule* – A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

34. *Project* – The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

35. *Project Manual* – The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

36. *Radioactive Material* – Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

37. *Related Entity* – An officer, director, partner, employee, agent, consultant, or subcontractor.

38. *Resident Project Representative* – The authorized representative of Engineer who may be assigned to the Site or any part thereof.

39. *Samples* – Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

40. *Schedule of Submittals* – A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

41. *Schedule of Values* – A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

42. *Shop Drawings* – All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

43. *Site* – Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

44. *Specifications* – That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

45. *Subcontractor* – An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

46. *Substantial Completion* – The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

47. *Successful Bidder* – The Bidder submitting a responsive Bid to whom Owner makes an award.

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48. *Supplementary Conditions* – That part of the Contract Documents which amends or supplements these General Conditions.

49. *Supplier* – A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor.

50. *Underground Facilities* – All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

51. Unit Price Work – Work to be paid for on the basis of unit prices.

52. *Work* – The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

53. *Work Change Directive* – A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and Agency upon recommendation of the Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following meaning.

B. *Intent of Certain Terms or Adjectives*

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered", "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action or determination will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day*

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

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D. *Defective*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

   a. does not conform to the Contract Documents, or

   b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents, or

   c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

F. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement.

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2.04 *Starting the Work*

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, Agency, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage

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as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

A. *Standards, Specifications, Codes, Laws, and Regulations*

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, or Engineer, or any of their Related Entities, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies

1. *Contractor's Review of Contract Documents Before Starting Work*: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. *Contractor's Review of Contract Documents During Performance of Work*: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor knew or reasonably should have known thereof.

B. Resolving Discrepancies

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

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3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3) or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer's consultants, including electronic media editions; or

2. reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaption by Engineer.

B. The prohibition of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

A. Copies of data furnished by Owner or Engineer to Contractor or Contractor to Owner or Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any,

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of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and

2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb

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such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer's Review*: After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. *Possible Price and Times Adjustments*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

   a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and

   b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

   a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

   b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

   c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, Owner and Engineer, and any of their Related Entities shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

   a. reviewing and checking all such information and data,

   b. locating all Underground Facilities shown or indicated in the Contract Documents,

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c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction, and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

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3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered to Contractor written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06. H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

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ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's authority to act.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver to Contractor, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

5.04 *Contractor's Liability Insurance*

A. Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

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3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

   a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

   b. by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include completed operations insurance;

4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

6. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.

   a. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

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5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (Contractor shall be responsible for any deductible or self-insured retention.). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

5. allow for partial utilization of the Work by Owner;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

B. Contractor shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

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5.07 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Contractor as trustee or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Contractor and made payable to Contractor as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Contractor shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof.

B. Contractor as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Contractor's exercise of this power. If such objection be made, Contractor as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Contractor as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Contractor as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of

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non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

6.02 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

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B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that:

1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;

3) it has a proven record of performance and availability of responsive service; and

b. Contractor certifies that, if approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times, and

2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

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2. Substitute Items

a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

c. The procedure requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented in the General Requirements and as Engineer may decide is appropriate under the circumstances.

d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

1) shall certify that the proposed substitute item will:

a) will perform adequately the functions and achieve the results called for by the general design,

b) be similar in substance to that specified, and

c) be suited to the same use as that specified;

2) will state:

a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time;

b) whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and

c) whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

3) will identify:

a) all variations of the proposed substitute item from that specified , and

b) available engineering, sales, maintenance, repair, and replacement services;

4) and shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

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C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

E. *Engineer's Cost Reimbursement*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

F. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity, nor

2. shall anything in the Contract Documents create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

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E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of Owner or Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's primary responsibility to make certain

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that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work, Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved

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Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or , or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

D. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract

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Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings*

a. Submit number of copies specified in the General Requirements.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples*

a. Submit number of Samples specified in the Specifications.

b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Submittal Procedures*

1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:

a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and

d. shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

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D. *Engineer's Review*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its Related Entities shall be entitled to rely on representation of Contractor's warranty and guarantee.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

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3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or

7. any correction of defective Work by Owner.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.

B. In any and all claims against Owner or Engineer or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

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C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with Owner's employees, or via other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and

2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

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B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's actions or inactions.

C. Contractor shall be liable to Owner and any other contractor for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by Engineer in preparing the Contract Documents.

8.06 *Insurance*

A. Owner's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility in respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

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8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents and will not be changed without written consent of Owner and Engineer.

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

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9.04 *Authorized Variations in Work*

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

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D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, subject to written approval by Agency at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.B.

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10.03 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any bond to be given to a surety, the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

A. *Engineer's Decision Required*: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action*: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part,

2. approve the Claim, or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

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E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to Engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

   a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

   b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are

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consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expressages, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A and 11.01.B.

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C. Contractor's Fee: When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. Cash Allowances

1. Contractor agrees that:

a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

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D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the Bid price of a particular item of Unit Price Work amounts to more than 5 percent of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect to any other item of Work; and

3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. Contractor's Fee: The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

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e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.B.

1. delays caused by or within the control of Contractor; or

D. Owner, Engineer and the Related Entities of each of them shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

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ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in said Paragraph 13.04.C; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

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B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or

2. correct such defective Work; or

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

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4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

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C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. *Applications for Payments*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations on the Site of the executed Work as an experienced and qualified design professional and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

a. the Work has progressed to the point indicated;

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b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

b. that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

a. to supervise, direct, or control the Work, or

b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

b. the Contract Price has been reduced by Change Orders;

c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

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D. *Reduction in Payment*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

   a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

   b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

   c. the Contractor's performance or furnishing of the Work is inconsistent with funding Agency requirements;

   d. there are other items entitling Owner to a set-off against the amount recommended; or

   e. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects to Owner's satisfaction the reasons for such action.

3. If it is subsequently determined that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1.

14.03 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, Owner, Agency, Contractor, and Engineer shall make a prefinal inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within 14 days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will within said 14 days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

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D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor will certify to Owner and Engineer that such part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner, Agency, and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

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2. The final Application for Payment shall be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;

   b. consent of the surety, if any, to final payment;

   c. a list of all Claims against Owner that Contractor believes are unsettled; and

   d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Payment Becomes Due*

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims. The remaining balance of any sum included in the final Application for Payment but held by OWNER for Work not fully completed and accepted will become due when the Work is fully completed and accepted.

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14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion),

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by

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Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

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ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Owner and Contractor may mutually request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process hall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or

2. agrees with the other party to submit the Claim to another dispute resolution process, or

3. gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

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17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

ARTICLE 18 – FEDERAL REQUIREMENTS

18.01 *Agency Not a Party*

A. This Contract is expected to be funded in part with funds provided by Agency. Neither Agency, nor any of its departments, entities, or employees is a party to this Contract.

18.02 *Contract Approval*

A. Owner and Contractor will furnish Owner's attorney such evidence as required so that Owner's attorney can complete and execute the following "Certificate of Owner's Attorney" (Exhibit GC-A) before Owner submits the executed Contract Documents to Agency for approval.

B. Concurrence by Agency in the award of the Contract is required before the Contract is effective.

18.03 *Conflict of Interest*

A. Contractor may not knowingly contract with a supplier or manufacturer if the individual or entity who prepared the plans and specifications has a corporate or financial affiliation with the supplier or manufacturer.

B. Owner's officers, employees, or agents shall not engage in the award or administration of this Contract if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when: (i) the employee, officer or agent; (ii) any member of their immediate family; (iii) their partner or (iv) an organization that employs, or is about to employ, any of the above, has a financial interest in Contractor. Owner's officers, employees, or agents shall neither solicit nor accept gratuities, favors or anything of monetary value from Contractor or subcontractors.

18.04 *Gratuities*

A. If Owner finds after a notice and hearing that Contractor, or any of Contractor's agents or representatives, offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of Owner or Agency in an attempt to secure this Contract or favorable treatment in awarding, amending, or making any determinations related to the performance of this Contract, Owner may, by written notice to Contractor, terminate this Contract. Owner may also pursue other rights and remedies that the law or this Contract provides. However, the existence of the facts on which Owner bases such findings shall be an issue and may be reviewed in proceedings under the dispute resolution provisions of this Contract.

B. In the event this Contract is terminated as provided in paragraph 18.04.A, Owner may pursue the same remedies against Contractor as it could pursue in the event of a breach of this Contract by Contractor. As a penalty, in addition to any other damages to which it may be entitled by law, Owner may pursue exemplary damages in an

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amount (as determined by Owner) which shall not be less than three nor more than ten times the costs Contractor incurs in providing any such gratuities to any such officer or employee.

18.05 *Audit and Access to Records*

A. For all negotiated contracts and negotiated modifications (except those of $10,000 or less), Owner, Agency, the Comptroller General, or any of their duly authorized representatives, shall have access to any books, documents, papers, and records of the Contractor, which are pertinent to the Contract, for the purpose of making audits, examinations, excerpts and transcriptions. Contractor shall maintain all required records for three years after final payment is made and all other pending matters are closed.

18.06 *Small, Minority and Women's Businesses*

A. If Contractor intends to let any subcontracts for a portion of the work, Contractor shall take affirmative steps to assure that small, minority and women's businesses are used when possible as sources of supplies, equipment, construction, and services. Affirmative steps shall consist of: (1) including qualified small, minority and women's businesses on solicitation lists; (2) assuring that small, minority and women's businesses are solicited whenever they are potential sources; (3) dividing total requirements when economically feasible, into small tasks or quantities to permit maximum participation of small, minority, and women's businesses; (4) establishing delivery schedules, where the requirements of the work permit, which will encourage participation by small, minority and women's businesses; (5) using the services and assistance of the Small Business Administration and the Minority Business Development Agency of the U.S. Department of Commerce; (6) requiring each party to a subcontract to take the affirmative steps of this section; and (7) Contractor is encouraged to procure goods and services from labor surplus area firms.

18.07 *Anti-Kickback*

A. Contractor shall comply with the Copeland Anti-Kickback Act (18 USC 874 and 40 USC 276c) as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Buildings or Public Works Financed in Whole or in Part by Loans or Grants of the United States"). The Act provides that Contractor or subcontractor shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public facilities, to give up any part of the compensation to which they are otherwise entitled. Owner shall report all suspected or reported violations to Agency.

18.08 *Clean Air and Pollution Control Acts*

A. If this Contract exceeds $100,000, Contractor shall comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 USC 7401 *et seq.*) and the Federal Water Pollution Control Act as amended (33 USC 1251 *et seq.*). Contractor will report violations to the Agency and the Regional Office of the EPA.

18.09 *State Energy Policy*

A. Contractor shall comply with the Energy Policy and Conservation Act (P.L. 94-163). Mandatory standards and policies relating to energy efficiency, contained in any applicable State Energy Conservation Plan, shall be utilized.

18.10 *Equal Opportunity Requirements*

A. If this Contract exceeds $10,000, Contractor shall comply with Executive Order 11246, "Equal Employment Opportunity," as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and as supplemented by regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

B. Contractor's compliance with Executive Order 11246 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative active obligations required by the Standard Federal Equal Employment

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Opportunity Construction Contract Specifications, as set forth in 41 CFR Part 60-4 and its efforts to meet the goals established for the geographical area where the Contract is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the Contract, and in each trade, and Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting Contractor's goals shall be a violation of the Contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

C. Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the Contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number; estimated dollar amount of subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the Contract is to be performed.

18.11 *Restrictions on Lobbying*

A. Contractor and each subcontractor shall comply with Restrictions on Lobbying (Public Law 101-121, Section 319) as supplemented by applicable Agency regulations. This Law applies to the recipients of contracts and subcontracts that exceed $100,000 at any tier under a Federal loan that exceeds $150,000 or a Federal grant that exceeds $100,000. If applicable, Contractor must complete a certification form on lobbying activities related to a specific Federal loan or grant that is a funding source for this Contract. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 USC 1352. Each tier shall disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Certifications and disclosures are forwarded from tier to tier up to the Owner. Necessary certification and disclosure forms shall be provided by Owner.

18.12 *Environmental Requirements*

A. When constructing a project involving trenching and/or other related earth excavations, Contractor shall comply with the following environmental constraints:

1. Wetlands – When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert wetlands.

2. Floodplains – When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert 100 year floodplain areas delineated on the latest Federal Emergency Management Agency Floodplain Maps, or other appropriate maps, i.e., alluvial soils on NRCS Soil Survey Maps.

3. Historic Preservation – Any excavation by Contractor that uncovers an historical or archaeological artifact shall be immediately reported to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the State Historic Preservation Officer (SHPO).

4. Endangered Species – Contractor shall comply with the Endangered Species Act, which provides for the protection of endangered and/or threatened species and critical habitat. Should any evidence of the presence of endangered and/or threatened species or their critical habitat be brought to the attention of Contractor, Contractor will immediately report this evidence to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the U.S. Fish and Wildlife Service.

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EXHIBIT GC-A

Certificate of Owner's Attorney

I, the undersigned, _____, the duly authorized and acting legal representative of _____, do hereby certify as follows:

I have examined the attached Contract(s) and performance and payment bond(s) and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements is adequate and has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with the terms, conditions, and provisions thereof.

_____

Date: _____

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SECTION 00800

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC No. 1910-8, 1996 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions will have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings indicated below, which are applicable to both the singular and plural thereof.

SC-1.01A.3 Add the following language to the end of paragraph 1.01.A.3:

The Application for Payment form to be used on this Project is included in the Contracting Requirements, Section 00620.

SC-1.01.A.9 Add the following language to the end of paragraph 1.01.A.9:

The Change Order form to be used on this Project is included in the Contracting Requirements, Section 00571.

SC-1.01.A.17 Add the following language at the end of paragraph 1.01.A.17:

The word Plans used in the specifications shall mean drawings as so defined.

SC-2.01.B Delete paragraph 2.01.B in its entirety and insert the following in its place.

B. Evidence of Insurance

1. CONTRACTOR shall deliver with the executed Agreement to the OWNER, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which OWNER or any additional insured may reasonably request) which CONTRACTOR is required to purchase and maintain in accordance with Article 5.
2. Before any work at the site is started, OWNER shall deliver to the CONTRACTOR certificates of insurance (and other evidence of insurance which CONTRACTOR or any additional insured may reasonably request) which is required to purchase and maintain in accordance with Article 5.

SC-4.02 Subsurface and Physical Conditions

Add the following new paragraph(s) immediately after paragraph 4.02.B3:

C. In the preparation of Drawings and Specifications, ENGINEER or ENGINEER's Consultants relied upon the following reports of explorations and tests of subsurface conditions at the Site:

Geotechnical Engineering Report dated September 5, 2008
Gestra Project No. 08052-10

D. Copies of reports and drawings itemized in SC-4.02.C that are not included with Bidding Documents may be examined at Robert E. Lee, 4664 Golden Pond Park Court, Hobart, Wisconsin, during regular business hours. These reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which CONTRACTOR may rely as identified and established above are incorporated therein by reference. CONTRACTOR is not entitled to rely upon other information and data utilized by ENGINEER and ENGINEER's consultants in the preparation of Drawings and Specifications.

SC-5.04 Add the following new paragraph immediately after paragraph 5.04.B:

C. The limits of liability for the insurance required by paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation, and related coverages under paragraphs 5.04.A.1 and A.2 of the General Conditions:

a.	State	Statutory
b.	Applicable Federal (e.g., Longshoreman's)	Statutory
c.	Employer's Liability	$500,000

2. Contractor's General Liability under paragraphs 5.04.A.3 through A.6 of the General Conditions which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody and control of Contractor:

a.	General Aggregate	$2,000,000
b.	Products - Completed Operations Aggregate	$1,000,000
c.	Personal and Advertising Injury	$1,000,000
d.	Each Occurrence (Bodily Injury and Property Damage)	$1,000,000
e.	Property Damage liability insurance will provide Explosion, Collapse, and Underground coverages where applicable.	
f.	Excess or Umbrella Liability	
	1) General Aggregate	$5,000,000
	2) Each Occurrence	$5,000,000

3. Automobile Liability under paragraph 5.04.A.6 of the General Conditions:

a.	Combined Single Limit of	$1,000,000

4. The Contractual Liability coverage required by paragraph 5.04.B.4 of the General Conditions shall be provided by the CONTRACTOR as part of the CONTRACTOR's General Liability coverage.

5. The Contractor shall include OWNER, ENGINEER and ENGINEER's Consultant by endorsement as additional insured in accordance with paragraph 5.04.B.

SC-5.06.B. Revise the first sentence of paragraph 5.06.B to read as follows:

B. CONTRACTOR shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary

Conditions, each of who is deemed to have an insurable interest and shall be listed as an insured or additional insured.

SC-6.02 Add the following to 6.02 B.: regular working hours are 7:00 a.m. – 8:00 p.m.

SC-6.05.C. Amend the paragraph by making two subparagraphs under the Title "C. Engineer's Evaluation." The paragraph text is retitled, 6.05.C.2 After Effective Date of Agreement. A new paragraph is added before this paragraph to read as follows:

1. During Bidding. The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, or "or-equal" materials and equipment as defined in paragraph 6.05 of the General Conditions, or those substitute or materials and equipment approved by the ENGINEER and identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of required type, function, and quality to be met by any proposed substitute or "or-equal" item. Request for ENGINEER's clarification of materials and equipment considered "or-equal" prior to the Effective Date of the Agreement must be received by the ENGINEER at least 5 days prior to the date for receipt of Bids. No item of material or equipment will be considered by ENGINEER as a substitute unless written request for approval has been submitted by Bidder and has been received by ENGINEER at least 15 days prior to the date for receipt of Bids. Each request shall conform to the requirements of paragraph 6.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon the Bidder. ENGINEER's decision of approval or disapproval of a proposed item will be final. If ENGINEER approves any proposed substitute item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.

SC-6.06.A Add the following language at the end of the second sentence of paragraph 6.06.A.:

Within five days of the Bid opening and before the Notice of Award, the apparent Successful Bidder is required to identify Subcontractors and Suppliers submitted to the ENGINEER and OWNER on the form provided in the Bidding Documents.

SC-6.06.C Add the following sentence at the end of paragraph 6.06.C:

OWNER or ENGINEER may furnish to any such Subcontractor, Supplier, or other individual or entity, to the extent practicable, information about amounts paid to CONTRACTOR on account of Work performed for CONTRACTOR by a particular Subcontractor, Supplier, or other individual or entity.

SC-6.19 Add the following sentence to 6.19:

D. The warranty period shall be 365 days from the date of substantial completion. All equipment shall be warranteed for a period of 365 days from the date of substantial completion or 18 months from the date of delivery, which ever is longer. If the project requires a county right-of-way permit, the contractor shall provide the warranty as stated in the permit.

SC-9.03.A Add the following language at the end of paragraph 9.03.A.:

The Duties, Responsibilities, and Limitations of Authority of the Resident Project Representative will be as stated in Exhibit D of the OWNER-ENGINEER Agreement, 1910-1-FA, 1997 Edition, as amended and executed for this specific Project.

SC-10.03.A Add the following at the end of paragraph 10.03.A:

4. Change Orders shall be prepared on the form included in the General Requirements.

SC-11.01.B.1 Revise the first sentence of paragraph 11.01.B.1 to read as follows: 1. Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnerships and sole proprietorships, general managers, engineers, architects, estimators, *project managers*, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by CONTRACTOR, whether at the Site or in CONTRACTOR's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 11.01.A.1 or specifically covered by paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the CONTRACTOR's fee.

SC-11.01.B Add 11.01.B.6 as follows: 6. The cost of company owned autos or trucks assigned to foremen, superintendants or project managers.

SC- 11.03.C Delete paragraph 11.03.C in its entirety and insert the following in its place:

C. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:
   1. If the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 15% from the estimated quantity of such item indicated in the Agreement; and
   2. If there is no corresponding adjustment with respect to any other item of Work; and
   3. If CONTRACTOR believes that CONTRACTOR has incurred additional expense as a result thereof; or if OWNER believes that the quantity variation entitles OWNER to an adjustment in the unit price, either OWNER or CONTRACTOR may make a claim for an adjustment in the Contract Price in accordance with Article 10 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

SC-12.01.C.2 Revise the sentence to read: 2. If a fixed fee is not agreed upon, or permitted by the funding agency, then a fee based on the following percentages of the various portions of the Cost of the Work:

SC-12.01.C.2.a Delete paragraphs SC.12.01.C.2.a-c in their entirety and insert the following:

a. for costs incurred under paragraphs 11.01.A.1 and 11.01.A.2, the CONTRACTOR's fee shall be 15 percent;

b. for costs incurred under paragraph 11.01.A.3, the CONTRACTOR's fee shall be 20 percent. The percentage adjustment for 11.01.A.3 shall include full compensation for general overhead and profit for the subcontractors and the CONTRACTOR's administrative costs including general supervision, overhead, profit, and any other expense required for the CONTRACTOR to administer the services of one of the subcontractors.

SC-14.02.A.1. Revise the first sentence of paragraph 14.02.A.1 to read as follows: 1. At least 10 days before the date established for each progress payment (but not more often than once a month), CONTRACTOR shall submit to ENGINEER for review an Application for

Payment filled out and signed by CONTRACTOR covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.

SC- 14.02.C. 1 Revise the first sentence of paragraph 14.02.C.1 to read as follows: 1. Thirty days after approval of the Application for Payment by the OWNER, the amount recommended by the engineer will (subject to the provisions of paragraph 14.02.D) become due, and when due will be paid by OWNER to CONTRACTOR.

SC-14.07.A.2.(i)Add the following language at the end of (i) of paragraph 14.07.A.2: ...and such other data and schedules as ENGINEER may reasonably require.

SC- 17.06 Add the following paragraph 17.06:

17.06 Wage Rates

A. The Contractor shall comply with all applicable federal, state and local rules and regulations regarding the posting, certification, and filing of Wage Rates paid to employees.

B A copy of the State of Wisconsin Dept. of Workforce Development (DWD) prevailing Wage Rates and Davis Bacon General Decision No. WI 20070019 for this project have been included. The Contractor shall pay the higher of the applicable wage rates.

Labor Standards

THE DAVIS-BACON ACT. This act requires that workers receive no less than the prevailing wages being paid for similar work in their locality. Prevailing wages are computed by the U.S. Department of Labor (USDOL) and are issued in the form of Federal wage decisions for each classification of work to be performed in the area.

Violation of the Davis-Bacon Act makes the contractor liable for unpaid wages and may result in suspension of payments, contract termination, and suspension or debarment of the contractor from participation in federally funded projects.

The US Department of Labor's website, www.dol.gov/dol/esa/public/programs/dbralindex.html contains additional information.

Contracts and subcontracts must include the required prevailing wage rate clauses.

THE COPELAND "ANTI-KICKBACK" ACT. This Act requires that workers be paid at least once a week, and without any deductions or rebates except permissible deductions. Permissible deductions include taxes, deductions the worker authorizes in writing, and those required by court processes. The Act also requires contractors to submit weekly payroll records and Statements of Compliance to the contracting agency. Regulations, Part 3, requires contractors and subcontractors on construction projects covered by the Davis-Bacon Act to submit each week a "statement of compliance" certifying compliance with the Davis-Bacon Act requirements. This "statement of compliance" is usually referred to as the certified payroll. This Act applies to all contracts covered by the Davis-Bacon Act.

Violation of the Copeland Act is a felony and may result in termination of the contract or criminal prosecution by the U.S. Government, punishable by a fine of $5,000, 5 years in prison, or both.

THE CONTRACT WORK HOURS AND SAFETY STANDARDS ACT (CWHSSA). This Act requires that workers receive "overtime" pay at a rate of one and one-half times their regularly hourly pay after they have worked 40 hours in one week on the federally funded project. The CWHSSA does not apply to contracts of $100,000 or less, however; the Fair Labor Standards Act will apply and overtime provisions are applicable to all contracts covered by the Davis-Bacon Act.

Violation of the CWHSSA makes the contractor liable for unpaid wages, liquidated damages of $10 per employee per day of violation, and, in cases of intentional violation, a fine of $1,000 and/or six months imprisonment for each offense. Violations may also result in termination of the contract.

SC-18.08 Delete paragraph 18.08.A in its entirety and insert the following in its place:

A. Where this Contract exceeds $100,000 CONTRACTOR shall comply with all the requirements of the Clean Air Act (42 U.S.C. §7414) and Section 308 of the Water Pollution Control Act (33 U.S.C. §1318) relating to inspection, monitoring, entry, reports, and information, as well as all other requirements specified in Section 114 of the Clean Air Act and Section 308 of the Water Pollution Control Act and all regulations and guidelines issued thereunder after the award of the contract. In so doing, the Contractor further agrees:

1. As a condition for the award of contract, to notify the Owner of the receipt of any communication from the Environmental Protection Agency (EPA) indicating that a facility to be utilized in the performance of the contract is under consideration to be listed on the EPA list of Violating Facilities. Prompt notification is required prior to contract award.
2. To certify that any facility to be utilized in the performance of any nonexempt contractor subcontract is not listed on the EPA list of Violating Facilities pursuant to 40 CFR Part 32 as of the date of contract award.
3. To include or cause to be included the above criteria and the requirements in every nonexempt subcontract and that the Contractor will take such action as the Government may direct as a means of enforcing such provisions.

- END OF SECTION –

SUBSURFACE INFORMATION

GEOTECHNICAL ENGINEERING REPORT

Booster Pump Station
Oak Creek, WI
Gestra Project No.:08052-10

Prepared For:
Oak Creek Water & Sewer
September 5, 2008

GESTRA

Geotechnical Engineering Report
Booster Pump Station
Oak Creek, WI
GESTRA Project No.: 08052-10
September 5, 2008

Geotechnical Engineering Report
Booster Pump Station
Oak Creek, WI
GESTRA Project No.: 08052-10
September 5, 2008

1.0 INTRODUCTION

This report presents the results of our subsurface exploration for the booster pump station planned near the Puetz Road reservoir at 8430 South Orchard Way in Oak Creek, WI. The engineering recommendations and analysis contained within this report are based on the following project information which is a projection of our understanding of the project. If for any reason actual project information differs from what is reported below, Gestra Engineering, Inc. should be contacted so that we can review our recommendations in light of the new information.

The project consists of a single-story slab-on-grade pump station building. The building is planned east of the storage reservoir in a gently sloping area with a finished floor level of about elevation 780 feet (Oak Creek Datum). The ground surface on the west side of the building is at roughly the planned slab level and the east side of the building is expected to have about 3 feet of fill.

2.0 EXPLORATION RESULTS

2.1 Surface Conditions

The Puetz Road ground surface reservoir is located west of the planned pump station building. To the south is West Orchard Way. To the north is a wooded area. To the east is a residence. The area is landscaped and gently sloping down to the east.

2.2 Subsurface Conditions

The results of our field and laboratory tests and observations are depicted on the test boring log included in the Appendix. Soils were grouped together based on similar observed properties. The stratification lines were estimated by the reviewing engineer based on the available data and experience. The actual in-situ changes between layers may differ slightly and may be more gradual than depicted on the boring log.

The soil condition encountered in borings B-1 through B-3 consisted of very stiff lean clay over dense to very dense silt. The clay soils extended to depths of 6 to 7.5 feet and had moisture content of 19 to 23 percent for the upper sample (depth of about 2 feet) and 16 to 18 percent for the lower samples. Pocket penetrmeter readings in the clay indicated an unconfined compressive strength of 2.0 to 4.25 tons per square foot.

Groundwater measurements were made during and after drilling operations prior to backfill. Groundwater was not measured in the borings. The borings were completed following an extended period of dry weather. If ground water depths are critical piezometers or monitoring wells should be installed.

3.0 ANALYSIS AND RECOMMENDATIONS

3.1 Foundation Recommendations

In our opinion, the foundations may be supported at normal excavation depths. It is our opinion the building can be designed for shallow foundations with an allowable bearing capacity of 4,000 psf. Higher bearing capacities may be possible if required for the project. We should review the foundation design if higher bearing pressures are needed.

Foundations are expected to be supported primarily on the very stiff lean clay. This material is moisture sensitive and may be easily disturbed when wet. If wet weather is anticipated during the excavation and placement of the foundations it may be cost effective to use a 2-inch thick layer of crushed stone on the footing subgrade to protect against disturbance and limit the length of weather related delays.

Interior footings on the east side of the building may require up to 2 feet of new fill. Fill placed within the building pad should be compacted to at least 98% of maximum dry density based on the Standard Proctor (ASTM D698).

We recommend that foundations be suitably reinforced in order to compensate for the effects of differential movements due to subsurface soil variations. If recommendations in this report are followed it is our opinion that settlements should be less than 1 inch total and ½ inch differential which is expected to be the tolerance for this structure. All perimeter foundations should bear a minimum of 48 inches below grade in order to protect the structure from frost heave.

3.2 Floor Slab Recommendations

Based on the soil exploration performed and project information, it is our opinion that if the site is prepared following our recommendations in the site preparation section, the subgrade should be suitable for supporting a typical slab-on-grade. In our opinion a subgrade modulus (k) value of 150 pci (from 1 ft plate) can be used in the design. This modulus value should be adjusted for the size of the slab/mat foundation. We recommend that the floor slabs be suitably reinforced and designed to be separate from the foundation system in order to allow for separate movements of either.

3.3 Seismic Site Classification

Site soils were assigned a site class in accordance with the International Building Code (IBC) classification system. Based on the definitions in IBC Table 1615.1.1, it is our opinion that the appropriate classification for the site is Class D, "Stiff Soil Profile". Based on site class D, and mapped spectral response acceleration S_s and S_1 for the site area, the site coefficient F_a and F_v from the Wisconsin Enrolled Commercial Building Code 2002 are 1.2 and 1.7, respectively.

4.0 EXPLORATION AND TESTING PROCEDURES

The boring locations were staked in the field and the ground surface elevations at the boring locations were recorded by Robert E. Lee & Associates. The borehole was drilled with a truck mounted CME 45 drill rig. The borehole was advanced by using hollow stem augers.

The soil samples were obtained at 2.5 foot intervals to a depth of 15 feet and then at a 5-foot interval to a depth of 20 feet. Representative soil samples were taken by the "Standard Method for Penetration Test and Split-Barrel Sampling of Soils" (ASTM D1586). A "cathead" hammer was used to advance the split spoon sampler. The soil sample was then placed in a jar and recorded for type, color, consistency, and moisture, sealed and then transported to the laboratory for further review and testing, if required. Consistency of the clay soils is measured with a pocket penetrometer device.

After completion of drilling operations, all the samples retained in the field are then transported to our laboratory and classified by our geotechnical engineer using the Unified Soil Classification System. The engineer then assigns a laboratory testing program suited to extract important index properties of the soil layers. Laboratory testing completed for this project included moisture content testing.

Standard of Care

Our exploration was limited to evaluating subsurface soil and groundwater conditions pertaining to the proposed project. Gestra Engineering did not perform any environmental, chemical, or hydrogeologic testing as these were not part of our work scope.

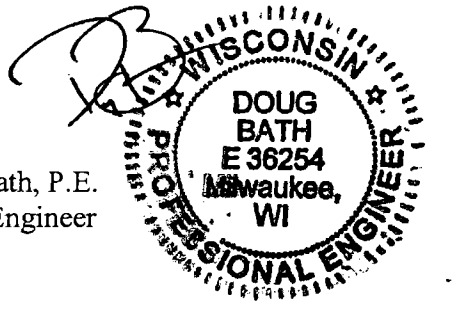
This report should be made available in its entirety to bidding contractors for information purposes. The soil borings and site sketch should not be detached from this report. Our report is not valid if used for purposes other than what is described in the report.

GESTRA has presented our professional opinions in this report in the form of recommendations. Our opinions are based on our understanding of current project information and related accepted engineering practices at the time of this report. Other than this, no warranty is implied or intended.

Sincerely,

Gestra Engineering, Inc.

Report Prepared By:



Doug Bath, P.E.
Senior Engineer

Appendix

Site Plan
Boring Log Nomenclature
Test Boring Log
Laboratory Test Results

Section 00820

Equal Opportunity Requirements

NOTE: CONTRACTOR TO SUBMIT THIS FORM (AD-1048) WITH BID IF PROPOSAL IS OVER $25,000

U.S. DEPARTMENT OF AGRICULTURE

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION - LOWER TIER COVERED TRANSACTIONS

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 7 CFR Part 3017, Section 3017.510, Participants' responsibilities. The regulations were published as Part IV of the January 30, 1989, Federal Register (pages 4722-4733). Copies of the regulations may be obtained by contacting the Department of Agriculture agency with which this transaction originated.

(BEFORE COMPLETING CERTIFICATION, READ INSTRUCTIONS ON REVERSE)

(1) The prospective lower tier participant certifies, by submission of this proposal, that neither it not its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Organization Name | PR/Award Number or Project Name

Name(s) and Title(s) of Authorized Representative(s)

Signature(s) | Date

Instructions for Certification

1. By signing and submitting this form, the prospective lower tier participant is providing the certification set out on the reverse side in accordance with these instructions.

2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later than determined that the prospective lower tier participant knowingly
rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

3. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

4. The terms "covered transactions," debarred," "suspended," "ineligible,", "lower tier covered transactions," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.

5. The prospective lower tier participant agrees by submitting this form that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

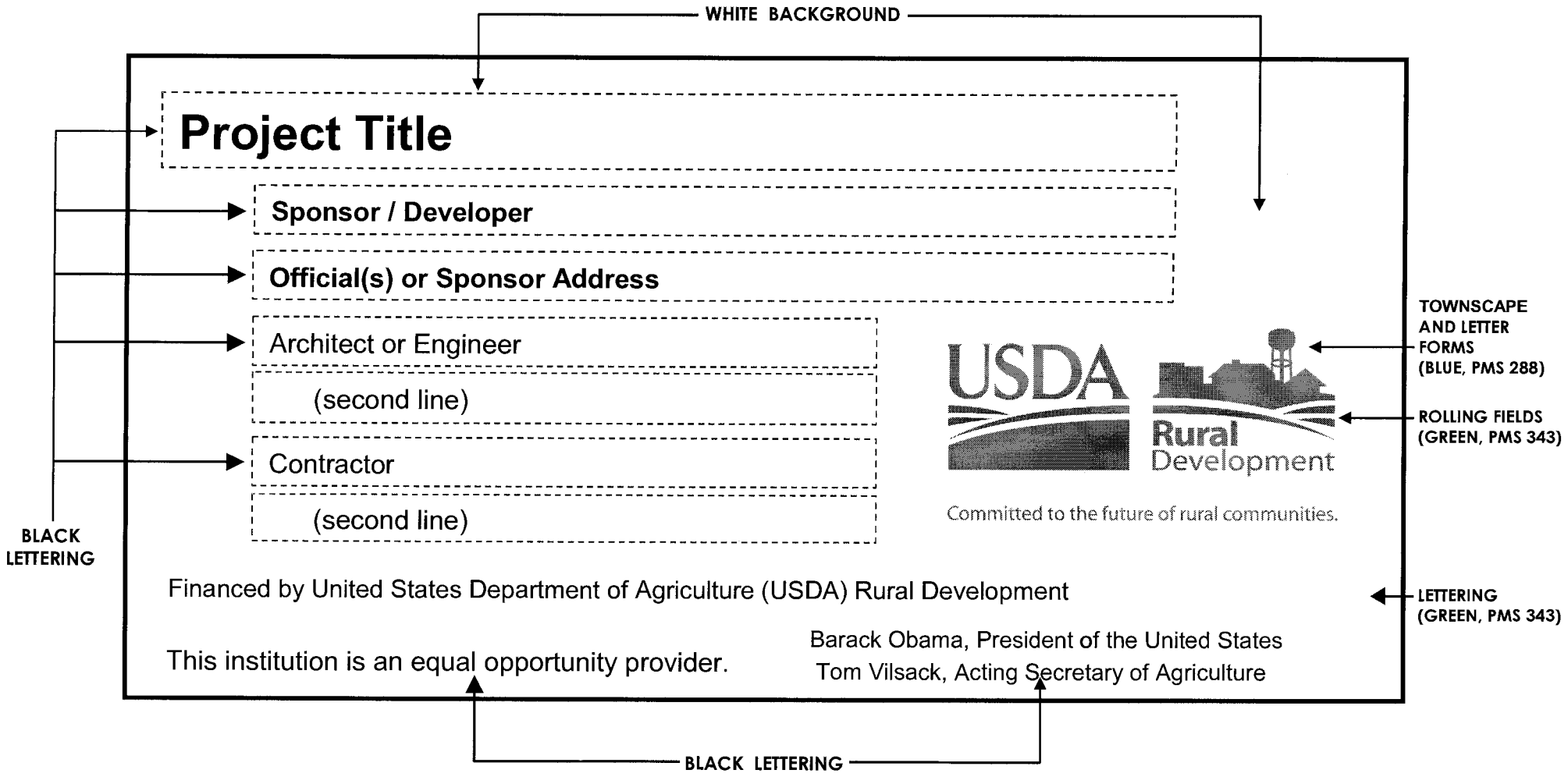
6. The prospective lower tier participant further agrees by submitting this form that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List.

8. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

9. Except for transactions authorized under paragraph 5 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

TEMPORARY CONSTRUCTION SIGN FOR RURAL DEVELOPMENT PROJECTS



SIGN DIMENSIONS: **1200 mm x 2400 mm x 19 mm (approx. 4' x 8' x ¾")**
PLYWOOD PANEL (APA RATED A-B GRADE–EXTERIOR)

USDA
Form RD 400-6
(Rev. 4-00)

Form Approved
OMB No. 0575-0018

COMPLIANCE STATEMENT

This statement relates to a proposed contract with_____

_____,

(Name of borrower or grantee)

who expects to finance the contract with assistance from either the Rural Housing Service (RHS), Rural Business-Cooperative Service (RBS), or the Rural Utilities Service (RUS) or their successor agencies, United States Department of Agriculture (whether by a loan, grant, loan insurance, guarantee, or other form of financial assistance).I am the undersigned bidder or prospective contractor, I represent that:

1. I ☐have, ☐ have not, participated in a previous contract or subcontract subject to Executive 11246 (regarding equal employment opportunity) or a preceding similar Executive Order.

2. If I have participated in such a contract or subcontract, I ☐ have, ☐ have not, filed all compliance reports that have been required to file in connection with the contract or subcontract.

If the proposed contract is for $50,000 or more and I have 50 or more employees, I also represent that:

3. I ☐have, ☐have not previsouly had contracts subject to the written affirmative action programs requirements of the Secretary of Labor.

4. If I have participated in such a contract or subcontract, I ☐ have, ☐ have not developed and placed on file at each establishment affirmative action programs as required by the rules and regulations of the Secretary of Labor.

I understand that if I have failed to file any compliance reports that have been required of me, I am not eligible and will not be eligible to have my bid considered or to enter into the proposed contract unless and until I make an arrangement regarding such reports that is satisfactory to either the RHS, RBS or RUS, or to the office where the reports are required to be filed.

I also certify that I do not maintain or provide for my employees any segregated facilities at any of my establishments, and that I do not permit my employees to perform their services at any location, under my control, where segregated facilities are maintained. I certify further that I will not maintain or provide for my employees any segregated facilities at any of my establishments, and that I will not permit my employees to perform their services at any location, under my control, where segregated facilities are maintained. I agree that a breach of this certification is a violation of the Equal Opportunity clause in my contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and wash rooms, restaurants and other eating areas time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. I further agree that (except where I have obtained identical certifications for proposed subcontractors for specific time periods) I will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause; that I will retain such certifications in my files; and that I will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods): (See Reverse).

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0575-0018. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENTS FOR CERTIFICATIONS OF NON-SEGREGATED FACILITIES

A certification of Nonsegregated Facilities, as required by the May 9, 1967, order (32F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted prior to the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e. quarterly, semiannually, or annually).

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

DATE _____

_____

(Signature of Bidder or Prospective Contractor)

_____

Address (including Zip Code)

CERTIFICATION FOR CONTRACTS, GRANTS AND LOANS

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant or Federal loan, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant or loan.

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant or loan, the undersigned shall complete and submit Standard Form - LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.

3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including contracts, subcontracts, and subgrants under grants and loans) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

_____ _____

(name) (date)

_____

(title)

oOo

DISCLOSURE OF LOBBYING ACTIVITIES

Approved by OMB
0348-0046

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352
(See reverse for public burden disclosure.)

1. Type of Federal Action:	2. Status of Federal Action:	3. Report Type:
☐ a. contract b. grant c. cooperative agreement d. loan e. loan guarantee f. loan insurance	☐ a. bid/offer/application b. initial award c. post-award	☐ a. initial filing b. material change **For Material Change Only:** year _____ quarter _____ date of last report _____

4. Name and Address of Reporting Entity:	5. If Reporting Entity in No. 4 is a Subawardee, Enter Name and Address of Prime:
☐ Prime ☐ Subawardee Tier _____, *if known*: **Congressional District**, *if known*: 4c	 **Congressional District**, *if known*:
6. Federal Department/Agency:	**7. Federal Program Name/Description:** CFDA Number, *if applicable*: _____
8. Federal Action Number, *if known*:	**9. Award Amount**, *if known*: $
10. a. Name and Address of Lobbying Registrant (*if individual, last name, first name, MI*):	**b. Individuals Performing Services** (*including address if different from No. 10a*) (*last name, first name, MI*):
11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.	Signature: _____ Print Name: _____ Title: _____ Telephone No.: _____ Date: _____

Federal Use Only:

Authorized for Local Reproduction
Standard Form LLL (Rev. 7-97)

INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.

2. Identify the status of the covered Federal action.

3. Identify the appropriate classification of this report. If this is a followup report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.

4. Enter the full name, address, city, State and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.

5. If the organization filing the report in item 4 checks "Subawardee," then enter the full name, address, city, State and zip code of the prime Federal recipient. Include Congressional District, if known.

6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.

7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.

8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 (e.g., Request for Proposal (RFP) number; Invitation for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., "RFP-DE-90-001."

9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.

10. (a) Enter the full name, address, city, State and zip code of the lobbying registrant under the Lobbying Disclosure Act of 1995 engaged by the reporting entity identified in item 4 to influence the covered Federal action.

    (b) Enter the full names of the individual(s) performing services, and include full address if different from 10 (a). Enter Last Name, First Name, and Middle Initial (MI).

11. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

According to the Paperwork Reduction Act, as amended, no persons are required to respond to a collection of information unless it displays a valid OMB Control Number. The valid OMB control number for this information collection is OMB No. 0348-0046. Public reporting burden for this collection of information is estimated to average 10 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, DC 20503.

SECTION 00825

MINORITY BUSINESS ENTERPRISE AND WOMEN BUSINESS ENTERPRISE (MBE/WBE)

The OAK CREEK WATER AND SEWER UTILITY is to take affirmative steps to assure minority and women business enterprises have equal access to the project bidding.

The OAK CREEK WATER AND SEWER UTILITY is requesting contractor cooperation in seeking MBE/WBE participation when subcontracts and lower-tier contracts are to be let by taking the following steps:

1. Placing qualified small and minority businesses and women's business enterprises on solicitation lists.

2. Assuring that small and minority businesses and women's business enterprises are solicited whenever they are potential sources.

3. Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority business and women's business enterprises.

4. Establishing delivery schedules, when the requirement permits, which encourage participation by small and minority business and womens' business enterprises.

5. Using the services and assistance of the Small Business Administration and the Minority Business Development Agency of the Department of Commerce.

- END OF SECTION -

SECTION C-941
CHANGE ORDER

Change Order

No. _____

Date of Issuance: _____ Effective Date: _____

Project: Puetz Road Booster Station	Owner: OAK CREEK WATER AND SEWER UTILITY	Owner's Contract No.: 4931-09-01
Contract: 4931-09-01		Date of Contract:
Contractor:		Engineer's Project No.: 4931-001

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

_____

_____

Attachments (list documents supporting change):

CHANGE IN CONTRACT PRICE:	**CHANGE IN CONTRACT TIMES:**
Original Contract Price: $_____	Original Contract Times: ☐ Working days ☐ Calendar days Substantial completion (days or date): _____ Ready for final payment (days or date): _____
[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____: $_____	[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____: Substantial completion (days): _____ Ready for final payment (days): _____
Contract Price prior to this Change Order: $_____	Contract Times prior to this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
[Increase] [Decrease] of this Change Order: $_____	[Increase] [Decrease] of this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
Contract Price incorporating this Change Order: $_____	Contract Times with all approved Change Orders: Substantial completion (days or date): _____ Ready for final payment (days or date): _____

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____	By: _____	By: _____
Engineer (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Date: _____	Date: _____	Date: _____

Approved by Funding Agency (if applicable):

_____ Date: _____

Change Order

Instructions

A. GENERAL INFORMATION

This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Times. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if they affect Price or Times.

Changes that affect Contract Price or Contract Times should be promptly covered by a Change Order. The practice of accumulating Change Orders to reduce the administrative burden may lead to unnecessary disputes.

If Milestones have been listed in the Agreement, any effect of a Change Order thereon should be addressed.

For supplemental instructions and minor changes not involving a change in the Contract Price or Contract Times, a Field Order should be used.

B. COMPLETING THE CHANGE ORDER FORM

Engineer normally initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by Contractor, or requests from Owner, or both.

Once Engineer has completed and signed the form, all copies should be sent to Owner or Contractor for approval, depending on whether the Change Order is a true order to the Contractor or the formalization of a negotiated agreement for a previously performed change. After approval by one contracting party, all copies should be sent to the other party for approval. Engineer should make distribution of executed copies after approval by both parties.

If a change only applies to price or to times, cross out the part of the tabulation that does not apply.

WAGE RATES—Dept. of Workforce Development

Jim Doyle
Governor
Roberta Gassman
Secretary
Jennifer A. Ortiz
Division Administrator

State of Wisconsin
Department of Workforce Development

EQUAL RIGHTS DIVISION
201 East Washington Avenue, Room A300
P.O. Box 8928
Madison, WI 53708
Telephone: (608) 266-6860
Fax: (608) 267-4592
TTY: (608) 264-8752
http://www.dwd.state.wi.us/

DEPARTMENTAL ORDER

MICHAEL J SULLIVAN, UTILITY ENGINEER
CITY OF OAK CREEK
170 W DREXEL AVE
OAK CREEK, WI 53154

RE: CITY OF OAK CREEK, PUETZ RD BOOSTER STATION
CITY OF OAK CREEK, MILWAUKEE CO, WI
Determination No. 200900713

The application which you filed or was filed on your behalf, by the person copied below, for a prevailing wage rate determination applicable to the above-referenced project has been received.

A survey was conducted to determine the prevailing wage rate for the trade(s) or occupation(s) needed to complete the project. The findings of the survey are set forth in the enclosed determination.

If you believe that the wage rate for any trade or occupation does not accurately reflect the prevailing wage rate in the city, village or town in which the project is located, you have the right to request the department to conduct an administrative review regarding such wage rate.

Your request must be made, in writing, within 30 days from the date indicated below and at least 10 days before the date a construction contract(s) is to be awarded or negotiated. Your request must also include wage rate information on at least three (3) similar projects located in the city, village or town where the proposed project is located on which some work was performed by the contested trade(s) or occupation(s) during the current survey period and which was previously considered by the department in issuing the enclosed determination. See s. DWD 290.10 of the Wisconsin Administrative Code and either s. 66.0903 (3)(br) or s. 103.49 (3)(c), Stats. for a complete explanation of the administrative review process.

Now, therefore, it is hereby ORDERED that the prevailing wage rates set forth in the enclosed determination shall only be applicable to the above referenced project. This ORDER shall be deemed a FINAL ORDER of this department unless a timely request for an administrative review is filed with the department or a construction contract(s) is not awarded or negotiated before the determination's expiration date.

DATED

4/10/2009

Enclosures

FOR THE DEPARTMENT

Dave Newman, Investigator
Labor Standards Bureau
Construction Wage Standards Section
(608) 266-2832

cc: DALE MARSH, CIVIL ENGINEERING MANAGER
ROBERT E LEE & ASSOCIATES
4664 GOLDEN POND PARK COURT
HOBART, WI 54155

PREVAILING WAGE RATE DETERMINATION

Issued by the State of Wisconsin
Department of Workforce Development
Pursuant to s. 66.0903, Stats.
Issued On: 4/10/2009

DETERMINATION NUMBER: 200900713

EXPIRATION DATE: Prime Contracts MUST Be Awarded Or Negotiated On Or Before 12/31/2009. If NOT, You MUST Reapply.

DESCRIPTION OF PROJECT: CITY OF OAK CREEK, PUETZ RD BOOSTER STATION
PROJECT NO:

LOCATION OF PROJECT: CITY OF OAK CREEK, MILWAUKEE CO, WI

CONTRACTING AGENCY: CITY OF OAK CREEK

CLASSIFICATION: Contractors are required to call the Department of Workforce Development if there are any questions regarding the proper trade or classification to be used for any worker on a public works project.

OVERTIME: Time and one-half must be paid for all hours worked over 10 hours per day and 40 hours per calendar week and for all hours worked on Saturday, Sunday and the following six (6) holidays: January 1; the last Monday in May; July 4; the 1st Monday in September; the 4th Thursday in November; December 25; the day before if January 1, July 4 or December 25 falls on a Saturday; the day following if January 1, July 4 or December 25 falls on a Sunday.

FUTURE INCREASE: If indicated for a specific trade or occupation, the full amount of such increase MUST be added to the "TOTAL" indicated for such trade or occupation on the date(s) such increase(s) becomes effective.

PREMIUM PAY: If indicated for a specific trade or occupation, the full amount of such pay MUST be added to the "HOURLY BASIC RATE OF PAY" indicated for such trade or occupation, whenever such pay is applicable.

SUBJOURNEY: Wage rates may be available for some of the classifications indicated below with the exception of laborers, truck drivers and heavy equipment operators. Any employer that desires to use any subjourney classification on this project MUST request the applicable wage rate from this department PRIOR to the date such classification is used on this project. Form ERD-10880 is available for this purpose.

BUILDING OR HEAVY CONSTRUCTION

Includes sheltered enclosures with walk-in access for the purpose of housing persons, employees, machinery, equipment or supplies and non-sheltered work such as canals, dams, dikes, reservoirs, storage tanks, etc. A sheltered enclosure need not be "habitable" in order to be considered a building. The installation of machinery and/or equipment, both above and below grade level, does not change a project's character as a building. On-site grading, utility work and landscaping are included within this definition. Residential buildings of four (4) stories or less, agricultural buildings, parking lots and driveways are NOT included within this definition.

Fringe Benefits Must Be Paid On All Hours Worked **TRADE OR OCCUPATION**	**HOURLY BASIC RATE OF PAY**	**HOURLY FRINGE BENEFITS**	**TOTAL**
	$	**$**	**$**
Acoustic Ceiling Tile Installer	30.69	18.12	48.81
Boilermaker Future Increase(s): Add $2.00 on 7/1/2009	32.14	18.77	50.91
Bricklayer, Blocklayer or Stonemason Future Increase(s): Add $1.95 6/01/2009; Add $1.95 6/07/2010; Add $1.95 6/06/2011	32.71	14.54	47.25
Cabinet Installer	24.10	0.00	24.10
Carpenter Future Increase(s): Add $2.50/hr on 6/1/2009; Add $2.60/hr on 5/31/2010; Add $2.65/hr on 6/6/2011.	30.52	14.47	44.99
Carpet Layer or Soft Floor Coverer Future Increase(s): Add $2.50/hr on 6/1/2009; Add $2.60/hr on 5/31/2010; Add $2.65/hr on 6/6/2011.	30.52	14.47	44.99

Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
Cement Finisher	27.82	12.97	40.79
Drywall Taper or Finisher Future Increase(s): Add $2.00/hr on 6/1/2009; Add $2.00/hr on 6/1/2010; Add $2.10/hr on 6/1/2011; Add $2.20/hr on 6/ 1/ 2012	27.47	14.09	41.56
Electrician Future Increase(s): Add $1.70/hr on 6/1/2009.	31.14	18.65	49.79
Elevator Constructor	43.01	14.74	57.75
Fence Erector	17.35	3.08	20.43
Fire Sprinkler Fitter	35.07	15.28	50.35
Glazier Future Increase(s): Add $2.00/hr on 6/1/2009; Add $2.00/hr on 6/1/2010; Add $2.10/hr on 6/1/2011; Add $2.15/hr on 6/ 1/ 2012.	30.24	13.95	44.19
Heat or Frost Insulator	30.63	16.66	47.29
Insulator (Batt or Blown)	22.07	11.30	33.37
Ironworker	28.96	18.18	47.14
Lather	29.02	13.72	42.74
Line Constructor (Electrical)	33.08	14.68	47.76
Marble Finisher	25.28	14.10	39.38
Marble Mason	31.60	14.10	45.70
Metal Building Erector	21.50	4.13	25.63
Millwright	27.04	17.96	45.00
Overhead Door Installer	25.04	13.01	38.05
Painter	25.79	13.50	39.29
Pavement Marking Operator	23.40	6.15	29.55
Piledriver Future Increase(s): Add $2.50/hr on 6/1/09; Add $2.60/hr on 5/31/10; Add $2.65/hr on 6/6/11. Premium Pay: Add $.65/hr for Piledriver Loftsman; Add $.75/hr for Sheet Piling Loftsman.	27.25	19.52	46.77
Pipeline Fuser or Welder (Gas or Utility)	28.58	14.64	43.22
Plasterer Future Increase(s): Add $2.15 6/1/2009; Add $2.25 5/31/2010; Add $2.40; 5/30/2011 Premium Pay: Swing stage work shall be paid $0.40 per hour in addition to regular rate	28.41	14.53	42.94
Plumber Future Increase(s): Add $2.70/hr on 5/31/2009; Add $2.85/hr on 5/31/2010.	35.18	13.71	48.89
Refrigeration Mechanic Future Increase(s): Add $2.85/hr on 6/1/2009.	34.41	16.14	50.55
Roofer or Waterproofer	28.85	11.98	40.83
Sheet Metal Worker Future Increase(s): Add $2.85 on 6/1/2009.	34.60	14.63	49.23
Steamfitter Future Increase(s): Add $2.85/hr on 6/1/2009.	34.41	16.14	50.55
Teledata Technician or Installer	23.04	13.30	36.34
Temperature Control Installer	33.11	14.84	47.95
Terrazzo Finisher	27.98	13.20	41.18
Terrazzo Mechanic	31.60	13.70	45.30
Tile Finisher	24.73	14.20	38.93

Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
Tile Setter	29.09	14.20	43.29
Tuckpointer, Caulker or Cleaner	30.37	13.55	43.92
Underwater Diver (Except on Great Lakes)	33.65	12.59	46.24
Well Driller or Pump Installer	24.22	14.80	39.02
Siding Installer	23.90	13.91	37.81
Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	25.22	12.05	37.27
Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	32.51	16.45	48.96
Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	16.00	8.00	24.00
Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	21.50	11.00	32.50
Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	18.19	10.04	28.23
TRUCK DRIVERS			
Single Axle or Two Axle	29.17	14.08	43.25
Three or More Axle	24.55	16.08	40.63
Articulated, Euclid, Dumptor, Off Road Material Hauler	28.59	17.64	46.23
Pavement Marking Vehicle	20.06	11.55	31.61
Truck Mechanic	19.00	11.14	30.14
LABORERS			
General Laborer	24.32	13.93	38.25
Asbestos Abatement Worker	20.50	12.12	32.62
Landscaper	23.91	0.84	24.75
Gas or Utility Pipeline Laborer (Other Than Sewer and Water)	24.67	11.87	36.54
Fiber Optic Laborer (Outside, Other Than Concrete Encased)	50.00	6.00	56.00
Railroad Track Laborer	13.00	2.26	15.26
HEAVY EQUIPMENT OPERATORS SITE PREPARATION, UTILITY AND LANDSCAPING WORK ONLY			
Crane; Backhoe (Track Type); Tractor or Truck Mounted Hydraulic Backhoe; Gradall (Cruz-Aire Type); Mechanic or Welder; Bulldozer or Endloader; Grader or Motor Patrol; Scraper (Self Propelled or Tractor Drawn) 5cu yards or more capacity; Power Subgrader; Asphalt Milling Machine; Boring Machine (Horizontal, Vertical or Directional); Air Track, Rotary or Percussion Drilling Machine; Trencher; Post Hole Digger or Driver; Tug or Launch (not performing work on the Great Lakes)	33.01	15.98	48.99
Farm or Industrial Type Tractor; Greaser; Compactor (Self-Propelled); Broom or Sweeper; Environmental Burner Premium Pay: Crane Operators with CCO certification add $.50/hr. Cranes with boom length over 200 ft. not exceeding 300 ft. OR lifting capacity over 200 ton not exceeding 300 ton add $.50/hr. Over 300 ton OR 300 ft. add $.01/hr. per foot OR ton whichever is greater.	33.97	16.75	50.72
Crusher, Screening or Wash Plant; Air Compressor (400 CFM or Over); Pump (3 Inch or Over) or Well Points; Refrigeration Plant or Freeze Machine; Skid Steer Loader (With or Without Attachments); Skid Rig; Stump Chipper; Mulcher; Vibratory Hammer or Extractor	26.94	16.75	43.69

Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
Premium Pay: Crane Operators with CCO certification add $.50/hr. Cranes with boom length over 200 ft. not exceeding 300 ft. OR lifting capacity over 200 ton not exceeding 300 ton add $.50/hr. Over 300 ton OR 300 ft. add $.01/hr. per foot OR ton whichever is greater.			
Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer	33.01	16.45	49.46
Work Performed on the Great Lakes Including Crane or Backhoe Operator; Mechanic or Welder; Assistant Hydraulic Dredge Engineer; Hydraulic Dredge Leverman or Diver's Tender Future Increase(s): Add $1.85/hr on 1/1/2010; Add $1.95/hr on 1/1/2011.	35.05	18.08	53.13
Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or more); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery. Future Increase(s): Add $1.85/hr on 1/1/2010; Add $1.95/hr on 1/1/2011.	31.20	17.96	49.16
Work Performed on the Great Lakes Including Deck Equipment Operator; Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under), Deck Hand, Deck Engineer or Assistant Tug Operator. Future Increase(s): Add $1.85/hr on 1/1/2010; Add $1.95/hr on 1/1/2011.	25.95	17.80	43.75
HEAVY EQUIPMENT OPERATORS EXCLUDING SITE PREPARATION, UTILITY, PAVING AND LANDSCAPING WORK			
Crane, Tower Crane or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons; Crane, Tower Crane or Derrick, With Boom, Leads and/or Jib Lengths Measuring 176 Feet or Over	35.26	16.75	52.01
Premium Pay: Crane Operators with CCO certification add $.50/hr. Cranes with boom length over 200 ft. not exceeding 300 ft. OR lifting capacity over 200 ton not exceeding 300 ton add $.50/hr. Over 300 ton OR 300 ft. add $.01/hr. per foot OR ton whichever is greater.			
Crane, Tower Crane or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under; Crane, Tower Crane or Derrick, With Boom, Leads and/or Jib Lengths Measuring 175 Feet or Under; Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Traveling Crane (Bridge Type); Caisson Rig; Pile Driver; Dredge (Not Performing Work on the Great Lakes)	34.76	16.75	51.51
Premium Pay: Crane Operators with CCO certification add $.50/hr. Cranes with boom length over 200 ft. not exceeding 300 ft. OR lifting capacity over 200 ton not exceeding 300 ton add $.50/hr. Over 300 ton OR 300 ft. add $.01/hr. per foot OR ton whichever is greater.			
Crane (Go-Devil Type) or Truck Mounted Hydraulic Crane (10 Tons or Under); Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs.; Tractor or Truck Mounted Hydraulic Backhoe; Gradall (Cruz-Aire Type); Mechanic or Welder; Bulldozer or Endloader; Grader or Motor Patrol; Scraper (Self Propelled or Tractor Drawn) 5 cu yards or more capacity; Concrete Pump, Grout Pump or Concrete Conveyor (Rotec or Bidwell Type); Concrete Breaker (Manual or Remote); Concrete Batch Plant; Power Subgrader; Concrete Spreader; Concrete Paver; Concrete Grinder or Planing Machine; Concrete Conveyor System; Concrete Slipform Placer; Curb and Gutter Machine; Roller (Over 5 Ton); Shouldering Machine; Boring Machine (Horizontal, Vertical or Directional); Air Track, Rotary or Percussion Drilling Machine; Straddle Carrier or Travel Lift; Forklift (Machinery Moving or Steel Erection); Manhoist or Elevator; Material or Stack Hoist; Trencher;	34.26	16.75	51.01

Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
Sideboom; Hydro-Blaster (10,000 PSI or Over); Post Hole Digger or Driver; Railroad Track Rail Leveling Machine, Tie Placer, Extractor, Tamper, Stone Leveler or Rehabilitation Equipment			
Premium Pay: Crane Operators with CCO certification add $.50/hr. Cranes with boom length over 200 ft. not exceeding 300 ft. OR lifting capacity over 200 ton not exceeding 300 ton add $.50/hr. Over 300 ton OR 300 ft. add $.01/hr. per foot OR ton whichever is greater.			
Farm or Industrial Type Tractor; Greaser; Compactor (Self-Propelled); Concrete Saw (Vermeer Type); Concrete Bump Cutter or Grooving Machine; Tining or Curing Machine; Roller (5 Tons or Under); Broom or Sweeper; Hoist (Tugger); Environmental Burner	23.40	6.15	29.55
Crusher, Screening or Wash Plant; Air, Electric or Hydraulic Jacking System; Air Compressor (400 CFM or Over); Generator (150 KW or Over); Pump (3 Inch or Over) or Well Points; Refrigeration Plant or Freeze Machine; Skid Steer Loader (With or Without Attachments); Robotic Tool Carrier (With or Without Attachments); Skid Rig; Stump Chipper; Mulcher; Vibratory Hammer or Extractor	28.87	15.42	44.29
Oiler; Forklift	26.94	16.75	43.69
Premium Pay: Crane Operators with CCO certification add $.50/hr. Cranes with boom length over 200 ft. not exceeding 300 ft. OR lifting capacity over 200 ton not exceeding 300 ton add $.50/hr. Over 300 ton OR 300 ft. add $.01/hr. per foot OR ton whichever is greater.			
Gas or Utility Pipeline, Except Sewer and Water (Primary Equipment)	34.01	17.23	51.24
Gas or Utility Pipeline, Except Sewer and Water (Secondary Equipment)	28.06	15.80	43.86
Future Increase(s): Add $1.60/hr on 6/1/2009; Add $1.60/hr on 6/1/2010; Add $1.60/hr on 6/1/2011.			
Fiber Optic Cable Equipment	21.84	14.55	36.39

SEWER, WATER OR TUNNEL CONSTRUCTION

Includes those projects that primarily involve public sewer or water distribution, transmission or collection systems and related tunnel work (excluding buildings).

Bricklayer, Blocklayer or Stonemason	31.60	13.70	45.30
Carpenter	29.02	13.66	42.68
Cement Finisher	27.00	12.83	39.83
Electrician	28.34	15.48	43.82
Fence Erector	17.35	3.08	20.43
Ironworker	28.96	18.18	47.14
Line Constructor (Electrical)	33.08	14.68	47.76
Pavement Marking Operator	23.40	6.15	29.55
Piledriver	26.12	18.40	44.52
Plumber	33.65	12.83	46.48
Steamfitter	33.11	14.84	47.95
Teledata Technician or Installer	23.04	13.30	36.34
Tuckpointer, Caulker or Cleaner	30.37	13.55	43.92
Underwater Diver (Except on Great Lakes)	33.65	12.59	46.24
Well Driller or Pump Installer	23.52	13.90	37.42
Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	25.22	12.05	37.27
Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	32.51	16.45	48.96

Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	16.00	8.00	24.00
Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	21.50	11.00	32.50
Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	18.19	10.04	28.23
TRUCK DRIVERS			
Single Axle or Two Axle	17.75	3.50	21.25
Three or More Axle	16.03	11.70	27.73
Articulated, Euclid, Dumptor, Off Road Material Hauler	28.59	17.64	46.23
Pavement Marking Vehicle	20.06	11.55	31.61
Truck Mechanic	19.00	11.14	30.14
LABORERS			
General Laborer	27.47	12.70	40.17
Landscaper	23.28	11.14	34.42
Flagperson or Traffic Control Person	18.85	13.43	32.28
Fiber Optic Laborer (Outside, Other Than Concrete Encased)	50.00	6.00	56.00
Railroad Track Laborer	13.00	2.26	15.26
HEAVY EQUIPMENT OPERATORS			
Crane, Tower Crane or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons; Crane, Tower Crane or Derrick, With Boom, Leads and/or Jib Lengths Measuring 176 Feet or Over; Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over Future Increase(s): Add $1.70/hr on 6/1/2009; Add $1.70/hr on 6/1/2010; Add $1.90/hr on 6/6/2011; Add $2.05/hr on 6/ 4/ 2012.	31.39	16.55	47.94
Crane, Tower Crane or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under; Crane, Tower Crane or Derrick, With Boom, Leads and/or Jib Lengths Measuring 175 Feet or Under; Traveling Crane (Bridge Type); Caisson Rig; Pile Driver; Dredge (Not Performing Work on the Great Lakes); Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs. Future Increase(s): Add $1.70/hr on 6/1/2009; Add $1.70/hr on 6/1/2010; Add $1.90/hr on 6/6/2011; Add $2.05/hr on 6/ 4/ 2012.	30.61	16.55	47.16
Truck Mounted Hydraulic Crane (10 Tons or Under); Tractor or Truck Mounted Hydraulic Backhoe; Gradall (Cruz-Aire Type); Mechanic or Welder; Bulldozer or Endloader; Grader or Motor Patrol; Concrete Pump, Grout Pump, or Concrete Conveyor (Rotec or Bidwell Type); Concrete Breaker (Manual or Remote); Concrete Batch Plant; Power Subgrader; Concrete Spreader; Concrete Paver; Concrete Grinder or Planing Machine; Concrete Conveyor System; Concrete Slipform Placer; Curb and Gutter Machine; Roller (Over 5 Ton); Shouldering Machine; Boring Machine (Horizontal, Vertical or Directional); Air Track, Rotary or Percussion Drilling Machine; Straddle Carrier or Travel Lift; Manhoist or Elevator; Material or Stack Hoist; Trencher; Sideboom; Post Hole Digger or Driver; Tug or Launch (Not Performing Work on the Great Lakes)	29.51	16.19	45.70
Farm or Industrial Type Tractor; Greaser; Compactor (Self-Propelled);	28.56	15.79	44.35

Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
Concrete Saw (Vermeer Type); Concrete Bump Cutter or Grooving Machine; Tining or Curing Machine; Roller (5 Ton or Under); Broom or Sweeper; Hoist (Tugger); Environmental Burner			
Crusher, Screening or Wash Plant; Air, Electric or Hydraulic Jacking System; Air Compressor (400 CFM or Over); Generator (150 KW or Over); Pump (3 Inch or Over) or Well Points; Refrigeration Plant or Freeze Machine; Skid Steer Loader (With or Without Attachments); Robotic Tool Carrier (With or Without Attachments); Skid Rig; Stump Chipper; Mulcher; Vibratory Hammer or Extractor; High Pressure Utility Locating Machine (daylighting machine).	28.56	15.35	43.91
Oiler; Forklift	28.42	15.95	44.37
Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer	33.01	16.45	49.46
Work Performed on the Great Lakes Including Crane or Backhoe Operator; Mechanic or Welder; Assistant Hydraulic Dredge Engineer; Hydraulic Dredge Leverman or Diver's Tender Future Increase(s): Add $1.85/hr on 1/1/2010; Add $1.95/hr on 1/1/2011.	35.05	18.08	53.13
Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or more); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	30.20	17.08	47.28
Work Performed on the Great Lakes Including Deck Equipment Operator; Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under), Deck Hand, Deck Engineer or Assistant Tug Operator. Future Increase(s): Add $1.85/hr on 1/1/2010; Add $1.95/hr on 1/1/2011.	25.95	17.80	43.75

LOCAL STREET OR MISCELLANEOUS PAVING CONSTRUCTION

Includes roads, streets, alleys, trails, bridges, paths, racetracks, parking lots and driveways (except residential or agricultural), public sidewalks or other similar projects (excluding projects awarded by the Wisconsin Department of Transportation).

Bricklayer, Blocklayer or Stonemason Future Increase(s): Add $1.90 06/01/2009; Add $1.95 05/31/2010	29.24	13.80	43.04
Carpenter	29.02	13.90	42.92
Cement Finisher	26.22	12.93	39.15
Electrician	33.59	17.04	50.63
Fence Erector	17.35	3.08	20.43
Ironworker	28.96	18.35	47.31
Line Constructor (Electrical)	33.08	14.68	47.76
Painter	26.04	12.60	38.64
Pavement Marking Operator	23.40	6.15	29.55
Piledriver	26.12	18.40	44.52
Roofer or Waterproofer	27.85	11.48	39.33
Teledata Technician or Installer Future Increase(s): Add $.90 on 6/1/09.	21.08	10.68	31.76
Tuckpointer, Caulker or Cleaner	30.37	13.55	43.92
Underwater Diver (Except on Great Lakes)	33.65	12.59	46.24

Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	25.22	12.05	37.27
Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	26.46	12.69	39.15
Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	23.16	11.48	34.64
Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	21.50	11.00	32.50
Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	18.19	10.04	28.23
TRUCK DRIVERS			
Single Axle or Two Axle	27.00	0.00	27.00
Three or More Axle	12.00	11.70	23.70
Articulated, Euclid, Dumptor, Off Road Material Hauler Future Increase(s): Add $1.75/hr on 6/1/2009; Add $1.80/hr on 6/1/2010.	29.89	16.41	46.30
Pavement Marking Vehicle	20.06	11.55	31.61
Shadow or Pilot Vehicle	35.51	0.00	35.51
Truck Mechanic	19.00	11.14	30.14
LABORERS			
General Laborer	22.51	13.69	36.20
Landscaper	16.57	0.00	16.57
Flagperson or Traffic Control Person	16.36	13.10	29.46
Fiber Optic Laborer (Outside, Other Than Concrete Encased)	50.00	6.00	56.00
Railroad Track Laborer	13.00	2.26	15.26
HEAVY EQUIPMENT OPERATORS CONCRETE PAVEMENT OR BRIDGE WORK ONLY			
Crane, Tower Crane or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons; Crane, Tower Crane or Derrick, With Boom, Leads and/or Jib Lengths Measuring 176 Feet or Over Future Increase(s): Add $1.75/hr on 6/1/09; Add $1.85/hr on 6/1/10; Add $1.95/hr on 6/1/11; Add $2/hr on 6/1/12; Add $2/hr on 6/ 1/ 13. Premium Pay: Effective 6/1/09 for "Airport Pavement or State Highway Construction" project type only, add $1.50/hr for work perfomed under artificial illumination with traffic control.	30.97	16.60	47.57
Crane, Tower Crane or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under; Crane, Tower Crane or Derrick, With Boom, Leads and/or Jib Lengths Measuring 175 Feet or Under; Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Pile Driver; Dredge (Not Performing Work on the Great Lakes) Future Increase(s): Add $1.75/hr on 6/1/09; Add $1.85/hr on 6/1/10; Add $1.95/hr on 6/1/11; Add $2/hr on 6/1/12; Add $2/hr on 6/ 1/ 13. Premium Pay: Effective 6/1/09 for "Airport Pavement or State Highway Construction" project type only, add $1.50/hr for work perfomed under artificial illumination with traffic control.	30.47	16.60	47.07
Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs.; Tractor or Truck Mounted Hydraulic Backhoe; Gradall (Cruz-Aire Type); Mechanic or Welder; Bulldozer or Endloader; Grader or Motor Patrol; Scraper (Self Propelled or Tractor Drawn) 5 cu yards or more capacity; Concrete Pump, Grout Pump or Concrete Conveyor (Rotec or Bidwell Type);	29.42	16.25	45.67

Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
Concrete Breaker (Manual or Remote); Concrete Batch Plant; Power Subgrader; Concrete Spreader; Concrete Paver; Concrete Grinder or Planing Machine; Concrete Conveyor System; Concrete Slipform Placer; Curb and Gutter Machine; Air Track, Rotary or Percussion Drilling Machine; Straddle Carrier or Travel Lift; Trencher; Post Hole Digger or Driver; Tug or Launch (Not Performing Work on the Great Lakes) Future Increase(s): Add $1.75/hr on 6/1/09; Add $1.85/hr on 6/1/10; Add $1.95/hr on 6/1/11; Add $2/hr on 6/1/12; Add $2/hr on 6/ 1/ 13.			
Farm or Industrial Type Tractor; Greaser; Compactor (Self-Propelled); Concrete Saw (Vermeer Type); Concrete Bump Cutter or Grooving Machine; Tining or Curing Machine; Environmental Burner Future Increase(s): Add $1.75/hr on 6/1/09; Add $1.85/hr on 6/1/10; Add $1.95/hr on 6/1/11; Add $2/hr on 6/1/12; Add $2/hr on 6/ 1/ 13. Premium Pay: Effective 6/1/09 for "Airport Pavement or State Highway Construction" project type only, add $1.50/hr for work perfomed under artificial illumination with traffic control.	29.97	16.60	46.57
Oiler; Crusher, Screening or Wash Plant; Air Compressor; Generator; Pump (3 Inch or Over) or Well Points; Forklift; Skid Steer Loader (With or Without Attachments); Skid Rig; Stump Chipper; Mulcher; Vibratory Hammer or Extractor	28.42	15.98	44.40
Fiber Optic Cable Equipment	26.46	12.69	39.15
Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer	33.01	16.45	49.46
Work Performed on the Great Lakes Including Crane or Backhoe Operator; Mechanic or Welder; Assistant Hydraulic Dredge Engineer; Hydraulic Dredge Leverman or Diver's Tender	33.90	17.19	51.09
Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or more); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	30.20	17.08	47.28
Work Performed on the Great Lakes Including Deck Equipment Operator; Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under), Deck Hand, Deck Engineer or Assistant Tug Operator.	24.25	16.25	40.50
HEAVY EQUIPMENT OPERATORS ASPHALT PAVEMENT OR OTHER WORK			
Crane, Tower Crane or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons; Crane, Tower Crane or Derrick, With Boom, Leads and/or Jib Lengths Measuring 176 Feet or Over Future Increase(s): Add $1.75/hr on 6/1/09; Add $1.85/hr on 6/1/10; Add $1.95/hr on 6/1/11; Add $2/hr on 6/1/12; Add $2/hr on 6/ 1/ 13. Premium Pay: Effective 6/1/09 for "Airport Pavement or State Highway Construction" project type only, add $1.50/hr for work perfomed under artificial illumination with traffic control.	30.97	16.60	47.57
Crane, Tower Crane or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under; Crane, Tower Crane or Derrick, With Boom, Leads and/or Jib Lengths Measuring 175 Feet or Under; Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Pile Driver; Dredge (Not Performing Work on the Great Lakes)	29.47	15.95	45.42
Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs.; Tractor or Truck Mounted Hydraulic Backhoe; Gradall (Cruz-Aire Type);	29.42	16.25	45.67

Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
Mechanic or Welder; Bulldozer or Endloader; Grader or Motor Patrol; Scraper (Self propelled or Tractor Drawn) 5 cu yards or more capacity; Concrete Breaker (Manual or Remote); Power Subgrader; Concrete Grinder or Planing Machine; Concrete Slipform Placer; Curb and Gutter Machine; Asphalt Plant; Asphalt Paver; Asphalt Screed; Asphalt Milling Machine; Roller (Over 5 Ton); Shouldering Machine; Trencher; Post Hole Digger or Driver Future Increase(s): Add $1.75/hr on 6/1/09; Add $1.85/hr on 6/1/10; Add $1.95/hr on 6/1/11; Add $2/hr on 6/1/12; Add $2/hr on 6/ 1/ 13.			
Farm or Industrial Type Tractor; Greaser; Compactor (Self-Propelled); Roller (5 Ton or Under); Broom or Sweeper; Environmental Burner Future Increase(s): Add $1.75/hr on 6/1/09; Add $1.85/hr on 6/1/10; Add $1.95/hr on 6/1/11; Add $2/hr on 6/1/12; Add $2/hr on 6/ 1/ 13.	29.42	16.25	45.67
Oiler; Crusher, Screening or Wash Plant; Air Compressor; Generator; Pump (3 Inch or Over) or Well Points; Forklift; Skid Steer Loader (With or Without Attachments); Skid Rig; Stump Chipper; Mulcher; Vibratory Hammer or Extractor Future Increase(s): Add $1.75/hr on 6/1/09; Add $1.85/hr on 6/1/10; Add $1.95/hr on 6/1/11; Add $2/hr on 6/1/12; Add $2/hr on 6/ 1/ 13.	29.42	16.25	45.67
Fiber Optic Cable Equipment	26.46	12.69	39.15

This document **MUST BE POSTED** by the **CONTRACTING AGENCY** in at least one conspicuous and easily accessible place **on the site of the project.** A local governmental unit may post this document at the place normally used to post public notices if there is no common site on the project. This document **MUST** remain posted during the entire time any worker is employed on the project and **MUST** be physically incorporated into the specifications and all contracts and most subcontracts. If you have any questions, please write to the Equal Rights Division, Labor Standards Bureau, P.O. Box 8928, Madison, Wisconsin 53708 or call (608) 266-2832.

The following statutory provisions apply to local governmental unit public works projects and are set forth below pursuant to the requirements of s. 66.0903 (8), Stats.

Each contractor, subcontractor or agent thereof performing work on a project that is subject to this section shall keep full and accurate records clearly indicating the name and trade or occupation of every person described in sub. (4) and an accurate record of the number of hours worked by each of those persons and the actual wages paid therefor.

Any contractor, subcontractor or agent thereof, who fails to pay the prevailing wage rate determined by the department under sub.(3) or who pays less than 1.5 times the hourly basic rate of pay for all hours worked in excess of the prevailing hours of labor determinded under sub.(3), shall be liable to any affected employe in the amount of his or her unpaid wages or his or her unpaid overtime compensation and in an additional equal amount as liquidated damages. An action to recover the liability may be maintained in any court of competent jurisdiction by any employe for and in behalf of that employe and other employes similarly situated. No employe may be a party plaintiff to any such action unless the employe consents in writing to become such a party and the consent is filed in the court in which the action is brought. Notwithstanding s. 814.04 (1), the court shall, in addition to any judgment awarded to the plaintiff, allow reasonable attorney fees and costs to be paid by the defendant.

State of Wisconsin
Department of Workforce Development
Equal Rights Division
Labor Standards Bureau

POST THE WHITE SHEET

As the public entity receiving this prevailing wage rate determination, YOU ARE REQUIRED by law to post the prevailing wage rate determination (i.e., white sheet) in at least one conspicuous and easily accessible place on the project site that is available to all construction workers. The white sheet must remain posted from the onset of the project until all construction labor on the project has been completed.
[*See,* Wis. Admin. Code §DWD 290.12(1)]

Posting the white sheet inside the general contractor's trailer does not meet this requirement. That placement is not available/accessible to all workers and is not a location over which you have control.

If you have questions about posting, please call (608)266-6861 and ask for prevailing wage intake.

Consolidated List of Debarred Contractors
Prepared and Issued By
State of Wisconsin
Department of Workforce Development

January 1, 2009

This list has been prepared in accordance with the provisions of s. 66.0903(12) and s. 103.49(7), Stats. and Chapter DWD 294 of the Wisconsin Administrative Code. All contractors on this list were found to have committed a "debarable offense" related to certain labor standard provisions determined or established for a state or local public works project. No state agency or local governmental unit may knowingly solicit bids from, negotiate with or award any contracts to or approve or allow any subcontracts with a debarred contractor, including all divisions, affiliates or other organizational elements of such contractor that are engaged in construction business activities, until the debarment is terminated. The name of each debarred contractor must remain on this list for a period of three (3) years from the termination date indicated below. The contractor is, however, only "debarred" from the "effective date" through the "termination date" indicated for that contractor. Questions regarding this list should be addressed to Julie Eckenwalder, Equal Rights Division, P. O. Box 8928, Madison, WI 53708 or call (608) 266-3148. Deaf, hearing or speech-impaired callers may contact the department by calling its TDD number (608) 264-8752.

Name of Contractor	Address	Effective Date	Termination Date	Cause Code	Date of Violation(s)	Limitations/Deviations
Bechitsao, Joel	See Tri-State Traffic Services, Inc.					
Custom Heating & Air LLC	283 Tony Lane, Green Bay, WI 54304	12/1/06	11/30/09	1, 2 and 4	2003 to 2004	None
D. C. Nevels Trucking, Inc. or D. C. Nevels Trucking	3246 North Sherman Blvd., Milwaukee, WI 53216	6/1/05	5/31/08	1, 2 and 4	2000-2002	None
Gibralter Construction LLC	N60 W15080 Bobolink Ave., Menomonee Falls, WI 53051	12/1/06	4/30/07	1	2005	None
HGI Painting	P. O. Box 3481, Janesville, WI 53545	11/1/04	10/31/07	1, 2 and 4	2001, 2002 and 2003	None
Hedding, Matt	C/O HGI Painting, P. O. Box 3481, Janesville, WI 53545	11/1/04	10/31/07	1, 2 and 4	2001, 2002 and 2003	None
Joseph Stoller Company	N8426 Hwy 42	2/1/2007	1/31/2010	1, 2	2004 and 2005	None

Name of Contractor	Address	Effective Date	Termination Date	Cause Code	Date of Violation(s)	Limitations/Deviations
Keiver, David	See Custom Heating & Air LLC	12/1/06	11/30/09	1, 2 and 4	2003 and 2004	None
Maria, Steve	See Gibralter Construction LLC					
Nevels, Betty	See D. C. Nevels Truckng, Inc.					
Nevels, Donald	See D. C. Nevels Trucking, Inc.					
Rick's Painting & Drywall	P. O. Box 2316, Eagle River, WI 54521	3/1/03	2/28/06	1	5/8/00 to 4/30/01	None
Stoller Enterprises LLC	N8426 Hwy 42, Algoma, WI 54201-9552	2/1/2007	1/31/2010	1 and 2	2005 to 2006	None
Stoller, Joseph	See Joseph Stoller Company					
Stoller, Patrick J.	See Stoller Enterprises LLC					
Strobel Construction, Inc..	P. O. Box 2316, Eagle River, WI 54521	3/1/03	2/28/06	1	5/8/00 to 4/30/01	None
Strobel, Diane	See Strobel Construction, Inc.					
Strobel, Rick	See Strobel Construction, Inc.					
Tri-State Traffic Services, Inc.	12555 West Burleigh Road #3, Brookfield, WI 53005	12/1/06	11/30/07	1, 2 and 4	2003-2004	None

Cause Code: 1 = Failure to Pay Straight Time 2 = Failure to Pay Overtime 3 = Kickback 4 = Payroll Records.

1 = Failure to Pay Straight Time 2 = Failure to Pay Overtime 3 = Kickback 4 = Payroll Records.

State of Wisconsin
Department of Workforce Development
Equal Rights Division
Labor Standards Bureau

Disclosure of Ownership

Notice required under Section 15.04(1)(m), Wisconsin Statutes. The statutory authority for the use of this form is prescribed in Sections 66.0903(12)(d) and 103.49(7)(d), Wisconsin Statutes. The use of this form is mandatory. The penalty for failing to complete this form is prescribed in Section 103.005(12), Wisconsin Statutes. Personal information you provide may be used for secondary purposes.

(1) On the date a contractor submits a bid to or completes negotiations with a state agency or local governmental unit, on a project subject to Section 66.0903 or 103.49, Wisconsin Statutes, the contractor shall disclose to such state agency or local governmental unit the name of any "other construction business", which the contractor, or a shareholder, officer or partner of the contractor, owns or has owned within the preceding three (3) years.

(2) The term "other construction business" means any business engaged in the erection, construction, remodeling, repairing, demolition, altering or painting and decorating of buildings, structures or facilities. It also means any business engaged in supplying mineral aggregate, or hauling excavated material or spoil as provided by Sections 66.0903(3), 103.49(2) and 103.50(2), Wisconsin Statutes.

(3) This form must ONLY be filed, with the state agency or local governmental unit that will be awarding the contract, if **both (A) and (B) are met**.

(A) The contractor, or a shareholder, officer or partner of the contractor:

(1) Owns at least a 25% interest in the "other construction business", indicated below, on the date the contractor submits a bid or completes negotiations.

(2) Or has owned at least a 25% interest in the "other construction business" at any time within the preceding three (3) years.

(B) The Wisconsin Department of Workforce Development (DWD) has determined that the "other construction business" has failed to pay the prevailing wage rate or time and one-half the required hourly basic rate of pay, for hours worked in excess of the prevailing hours of labor, to any employee at any time within the preceding three (3) years.

Other Construction Business

Name of Business			
Street Address or P O Box	City	State	Zip Code
Name of Business			
Street Address or P O Box	City	State	Zip Code
Name of Business			
Street Address or P O Box	City	State	Zip Code
Name of Business			
Street Address or P O Box	City	State	Zip Code

I hereby state under penalty of perjury that the information, contained in this document, is true and accurate according to my knowledge and belief.

Print the Name of Authorized Officer			
Signature of Authorized Officer	Date Signed		
Name of Corporation, Partnership or Sole Proprietorship			
Street Address or P O Box	City	State	Zip Code

If you have any questions call (608) 266-6861

DISCLAIMER

Effective May 1, 2007 employers performing work on public works construction projects in Wisconsin for municipal government and state building projects will be required to have a written substance abuse testing program in place. The provisions of this requirement are contained in Act 181. The Department of Workforce Development is not responsible for enforcement of this law or authorized to answer questions concerning the provisions of Act 181. For legal advice on complying with Act 181 you may wish to consult with a private attorney.

2005 Assembly Bill 736

Date of enactment: **March 22, 2006**
Date of publication*: **April 5, 2006**

2005 WISCONSIN ACT 181

AN ACT *to create* 103.503 of the statutes; **relating to:** substance abuse by employees who are required to be paid the prevailing wage rate for work performed on projects of public works, other than state highway projects.

The people of the state of Wisconsin, represented in senate and assembly, do enact as follows:

SECTION 1. 103.503 of the statutes is created to read:

103.503 Substance abuse prevention on public works projects. (1) DEFINITIONS. In this section:

(a) "Accident" means an incident caused, contributed to, or otherwise involving an employee that resulted or could have resulted in death, personal injury, or property damage and that occurred while the employee was performing the work described in s. 66.0903 (4) or 103.49 (2m) on a project.

(b) "Alcohol" has the meaning given in s. 340.01 (1q).

(c) "Contracting agency" means a local governmental unit, as defined in s. 66.0903 (1) (d), or a state agency, as defined in s. 103.49 (1) (f), that has contracted for the performance of work on a project.

(d) "Drug" means any controlled substance, as defined in s. 961.01 (4), or controlled substance analog, as defined in s. 961.01 (4m), for which testing is required by an employer under its substance abuse prevention program under this section.

(e) "Employee" means a laborer, worker, mechanic, or truck driver who performs the work described in s. 66.0903 (4) or 103.49 (2m) on a project.

(f) "Employer" means a contractor, subcontractor, or agent of a contractor or subcontractor that performs work on a project.

(g) "Project" mean a project of public works that is subject to s. 66.0903 or 103.49.

(2) SUBSTANCE ABUSE PROHIBITED. No employee may use, possess, attempt to possess, distribute, deliver, or be under the influence of a drug, or use or be under the influence of alcohol, while performing the work described in s. 66.0903 (4) or 103.49 (2m) on a project. An employee is considered to be under the influence of alcohol for purposes of this subsection if he or she has an alcohol concentration that is equal to or greater than the amount specified in s. 885.235 (1g) (d).

(3) SUBSTANCE ABUSE PREVENTION PROGRAMS REQUIRED. (a) Before an employer may commence work on a project, the employer shall have in place a written program for the prevention of substance abuse among its employees. At a minimum, the program shall include all of the following:

1. A prohibition against the actions or conditions specified in sub. (2).

2. A requirement that employees performing the work described in s. 66.0903 (4) or 103.49 (2m) on a project submit to random, reasonable suspicion, and post-accident drug and alcohol testing and to drug and alcohol

* Section 991.11, WISCONSIN STATUTES 2003-04 : Effective date of acts. "Every act and every portion of an act enacted by the legislature over the governor's partial veto which does not expressly prescribe the time when it takes effect shall take effect on the day after its date of publication as designated" by the secretary of state [the date of publication may not be more than 10 working days after the date of enactment].

testing before commencing work on a project, except that testing of an employee before commencing work on a project is not required if the employee has been participating in a random testing program during the 90 days preceding the date on which the employee commenced work on the project.

3. A procedure for notifying an employee who violates sub. (2), who tests positive for the presence of a drug in his or her system, or who refuses to submit to drug or alcohol testing as required under the program that the employee may not perform work on a project until he or she meets the conditions specified in sub. (4) (b) 1. and 2.

(b) Each employer shall be responsible for the cost of developing, implementing, and enforcing its substance abuse prevention program, including the cost of drug and alcohol testing of its employees under the program. The contracting agency is not responsible for that cost, for the cost of any medical review of a test result, or for any rehabilitation provided to an employee.

(4) EMPLOYEE ACCESS TO PROJECT. (a) No employer may permit an employee who violates sub. (2), who tests positive for the presence of a drug in his or her system, or who refuses to submit to drug or alcohol testing as required under the employer's substance abuse prevention program under sub. (3) to perform work on a project until he or she meets the conditions specified in par. (b) 1. and 2. An employer shall immediately remove an employee from work on a project if any of the following occurs:

1. The employee violates sub. (2), tests positive for the presence of a drug in his or her system, or refuses to submit to drug or alcohol testing as required under the employer's substance abuse prevention program.

2. An officer or employee of the contracting agency has a reasonable suspicion that the employee is in violation of sub. (2) and requests the employer to immediately remove the employee from work on the project.

(b) An employee who is barred or removed from work on a project under par. (a) may commence or return to work on the project upon his or her employer providing to the contracting agency documentation showing all of the following:

1. That the employee has tested negative for the presence of drugs in his or her system and is not under the influence of alcohol as described in sub. (2).

2. That the employee has been approved to commence or return to work on the project in accordance with the employer's substance abuse prevention program.

(c) Testing for the presence of drugs or alcohol in an employee's system and the handling of test specimens shall be conducted in accordance with guidelines for laboratory testing procedures and chain–of–custody procedures established by the substance abuse and mental health services administration of the federal department of health and human services.

(5) LOCAL ORDINANCES; STRICT CONFORMITY REQUIRED. A local governmental unit, as defined in s. 66.0903 (1) (d), may enact an ordinance regulating the conduct regulated under this section only if the ordinance strictly conforms to this section.

SECTION 2. **Initial applicability.**

(1) This act first applies to a contract to perform work on a project, as defined in section 103.503 (1) (g) of the statutes, as created by this act, for which bids are opened on the effective date of this subsection or, if bids are not solicited for the contract, to a contract to perform such work entered into on the effective date of this subsection, except that this This act first applies to an employee who is affected by a collective bargaining agreement that contains provisions inconsistent with this act on the day on which the collective bargaining agreement expires or is extended, modified, or renewed, whichever occurs first.

SECTION 3. **Effective date.**

(1) This act takes effect on the first day of the 13th month beginning after publication.

State of Wisconsin
Department of Workforce Development
Equal Rights Division
Labor Standards Bureau

Prime Contractor Affidavit of Compliance With Prevailing Wage Rate Determination

NOTICE REQUIRED UNDER Section 15.04(1) (m), Wisconsin Statutes. Authorization for this form is provided under Sections, 66.0903(9) (b) and 103.49(4r) (9b) Wisconsin Statutes. The use of this form is mandatory. The penalty for failing to complete this form is prescribed in Section 103.005(12), Wisconsin Statutes. Personally identifiable information may be used for secondary purposes.

This form must **ONLY** be filed with the **Awarding Agency** indicated below.

State Of_____))SS County Of _____)	Project Name	
	Project Number	Determination Number
	Date Determination Issued	Date of Contract
	Awarding Agency	
	Date Work Completed	

After being duly sworn, the person whose name and signature appears below hereby states under penalty of perjury that

- **I am** the duly authorized officer of the corporation, partnership, sole proprietorship or business indicated below and have recently completed all of the work required under the terms and conditions of a contract with the above-named awarding agency and make this affidavit in accordance with the requirements set forth in Section 66.0903(9)(c) or 103.49(4r)(c), Wisconsin Statutes and Chapter DWD 290 of the Wisconsin Administrative Code in order to obtain FINAL PAYMENT from such awarding agency.
- **I have** fully complied with all of the wage and hour requirements applicable to this project, including all of the requirements set forth in the prevailing wage rate determination indicated above which was issued for such project by the Department of Workforce Development on the date indicated above.
- **I have** received the required affidavit of compliance from each of my agents and subcontractors that performed work on this project and have listed each of their names and addresses on page 2 of this affidavit.
- **I have** full and accurate records that clearly indicate the name and trade or occupation of every worker(s) that I employed on this project, including an accurate record of the hours worked and actual wages paid to such worker(s).
- **I will** retain the records and affidavit(s) described above and make them available for inspection for a period of at least three (3) years from the completion date indicated above at the address indicated below and shall not remove such records or affidavit(s) without prior notification to the awarding agency indicated above.

Name of Corporation, Partnership, Sole Proprietorship or Business				
Street Address or P O Box	City	State	Zip Code	Telephone Number ( )
Print Name of Authorized Officer			Date Signed	
Signature of Authorized Officer				

List of Agents and Subcontractors

Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( )			Telephone Number ( )		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( )			Telephone Number ( )		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( )			Telephone Number ( )		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( )			Telephone Number ( )		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( )			Telephone Number ( )		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( )			Telephone Number ( )		

If you have any questions call (608) 266-6861

State of Wisconsin
Department of Workforce Development
Equal Rights Division
Labor Standards Bureau

Agent or Subcontractor Affidavit of Compliance With Prevailing Wage Rate Determination

NOTICE REQUIRED UNDER Section 15.04(1) (m), Wisconsin Statutes. Authorization for this form is provided under Sections, 66.0903(9) (b) and 103.49(4r)(9b) Wisconsin Statutes. The use of this form is mandatory. The penalty for failing to complete this form is prescribed in Section 103.005(12), Wisconsin Statutes. Personally identifiable information may be used for secondary purposes.

This form must **ONLY** be filed with the **Awarding Contractor** indicated below.

State Of _____))SS County Of _____)	Project Name	
	Project Number	Determination Number
	Date Determination Issued	Date of Subcontract
	Awarding Contractor	
	Date Work Completed	

After being duly sworn, the person whose name and signature appears below hereby states under penalty of perjury that

- **I am** the duly authorized officer of the corporation, partnership, sole proprietorship or business indicated below. We have recently completed all of the work required under the terms and conditions of a subcontract with the above-named awarding contractor. We make this affidavit in accordance with the requirements set forth in Section 66.0903(9)(b) or 103.49(4r)(b), Wisconsin Statutes and Chapter DWD 290 of the Wisconsin Administrative Code in order to obtain FINAL PAYMENT from such awarding contractor.
- **I have** fully complied with the entire wage and hour requirements applicable to this project, including all of the requirements set forth in the prevailing wage rate determination indicated above which was issued for such project by the Department of Workforce Development on the date indicated above.
- **I have** received the required affidavit of compliance from each of my agents and subcontractors that performed work on this project and have listed each of their names and addresses on page 2 of this affidavit.
- **I have** full and accurate records that clearly indicate the name and trade or occupation of every worker(s) that I employed on this project, including an accurate record of the hours worked and actual wages paid to such worker(s).
- **I will** retain the records and affidavit(s) described above and make them available for inspection for a period of at least three (3) years from the completion date indicated above at the address indicated below and shall not remove such records or affidavit(s) without prior notification to the awarding contractor.

Name of Corporation, Partnership, Sole Proprietorship or Business				
Street Address	City	State	Zip Code	Telephone Number ( )
Print Name of Authorized Officer			Date Signed	
Signature of Authorized Officer				

List of Agents and Subcontractors

Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( )			Telephone Number ( )		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( )			Telephone Number ( )		
Name			Name		
Street Address			Street Address		
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Telephone Number ( )			Telephone Number ( )		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( )			Telephone Number ( )		

If you have any questions call (608) 266-6861

State of Wisconsin
Department of Workforce Development
Equal Rights Division
Labor Standards Bureau

Request To Employ Subjourneyperson

Personal information you provide may be used for secondary purposes. [See Section 15.04(1)(m), Wisconsin Statutes for details.] The use of this form is mandatory. The authority for the use of this form is prescribed in Section DWD 290.025, Wisconsin Administrative Code. The penalty for failing to complete this form is prescribed in Section 103.005(12), Wisconsin Statutes.

The employer indicated below requests that the Department of Workforce Development (DWD) determine the prevailing wage rate(s) and related qualifications to enable such employer to utilize a subjourneyperson(s) on the following public works project, in accordance with the provisions of Section DWD 290.025, Wisconsin Administrative Code.

1. Name of Public Works Project	
County	**City, Village or Township**
Determination Number	**Project Number**

2. Name of Employee (Last, First and Initial)	**P.O. Box or Street Address**	**City**	**State**	**Zip Code**	**Date of Birth**	**Journey Classification**

3. Name of Employer (Print)	**Name of Person Making Request (Print)**		
P O Box or Street Address	**City**	**State**	**Zip Code**
Telephone Number ( )	**Title of Requestor**		

READ CAREFULLY: I fully understand that this request is ONLY applicable to the project and employee(s) listed above and that such employee(s) will ONLY work under the direction of and directly assist a skilled trades employee by frequently using the tools of a skilled trades employee and will NOT regularly perform the duties of a general laborer, heavy equipment operator or truck driver. If the employee(s) indicated above regularly perform(s) the work of a different trade or occupation, he/she will be compensated for such work at the applicable journeypersons prevailing wage rate. I agree not to employ any employee as a subjourneyperson on this project until I receive written confirmation from the DWD. After such confirmation is received, I will compensate the employee(s) indicated above in strict accordance with the directions received from the DWD.

Signature of Requestor _____ Date Signed _____

MAIL COMPLETED REQUEST TO Equal Rights Division, Labor Standards Bureau, P. O. Box 8928 Madison WI 53708.
You may call (608) 266-6860 if you need assistance in completing your request

WAGE RATES—Davis Bacon

GENERAL DECISION: WI20080008 03/13/2009 WI8

Date: March 13, 2009
General Decision Number: WI20080008 03/13/2009

Superseded General Decision Number: WI20070008

State: Wisconsin

Construction Types: Heavy (Sewer and Water Line and Tunnel)

Counties: Wisconsin Statewide.

TUNNEL, SEWER & WATER LINE CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	02/08/2008
1	02/29/2008
2	05/02/2008
3	06/13/2008
4	06/27/2008
5	07/25/2008
6	08/08/2008
7	08/15/2008
8	08/22/2008
9	08/29/2008
10	09/12/2008
11	10/03/2008
12	10/10/2008
13	11/07/2008
14	12/19/2008
15	03/13/2009

BRWI0001-002 06/01/2008

CRAWFORD, JACKSON, JUNEAU, LA CROSSE, MONROE, TREMPEALEAU, AND VERNON COUNTIES

	Rates	Fringes
BRICKLAYER	$ 29.24	13.80

BRWI0002-002 06/01/2008

ASHLAND, BAYFIELD, DOUGLAS, AND IRON COUNTIES

	Rates	Fringes
BRICKLAYER	$ 35.24	13.35

BRWI0002-005 06/01/2008

ADAMS, ASHLAND, BARRON, BROWN, BURNETT, CALUMET, CHIPPEWA, CLARK, COLUMBIA, DODGE, DOOR, DUNN, FLORENCE, FOND DU LAC, FOREST, GREEN LAKE, IRON, JEFFERSON, KEWAUNEE, LANGLADE, LINCOLN, MANITOWOC, MARATHON, MARINETTE, MARQUETTE, MENOMINEE, OCONTO, ONEIDA, OUTAGAMIE, POLK, PORTAGE, RUSK, ST CROIX, SAUK, SHAWANO, SHEBOYGAN, TAYLOR, VILAS, WALWORTH, WAUPACA, WAUSHARA, WINNEBAGO, AND WOOD COUNTIES

	Rates	Fringes

CEMENT MASON/CONCRETE FINISHER...$ 28.15 12.80

BRWI0003-002 06/01/2008

BROWN, DOOR, FLORENCE, KEWAUNEE, MARINETTE, AND OCONTO COUNTIES

	Rates	Fringes
BRICKLAYER	$ 29.24	13.80

BRWI0004-002 06/01/2008

KENOSHA, RACINE, AND WALWORTH COUNTIES

	Rates	Fringes
BRICKLAYER	$ 32.88	14.50

BRWI0006-002 06/01/2008

ADAMS, CLARK, FOREST, LANGLADE, LINCOLN, MARATHON, MENOMINEE, ONEIDA, PORTAGE, PRICE, TAYLOR, VILAS AND WOOD COUNTIES

	Rates	Fringes
BRICKLAYER	$ 29.74	13.30

BRWI0007-002 06/01/2008

GREEN, LAFAYETTE, AND ROCK COUNTIES

	Rates	Fringes
BRICKLAYER	$ 30.41	14.30

BRWI0008-002 06/01/2008

MILWAUKEE, OZAUKEE, WASHINGTON, AND WAUKESHA COUNTIES

	Rates	Fringes
BRICKLAYER	$ 32.71	14.54

BRWI0009-001 06/01/2008

GREEN LAKE, MARQUETTE, OUTAGAMIE, SHAWANO, WAUPACA, WASHARA, AND WINNEBAGO COUNTIES

	Rates	Fringes
BRICKLAYER	$ 29.24	13.80

BRWI0011-002 06/01/2008

CALUMET, FOND DU LAC, MANITOWOC, AND SHEBOYGAN COUNTIES

	Rates	Fringes
BRICKLAYER	$ 29.24	13.80

BRWI0013-002 06/01/2008

DANE, GRANT, IOWA, AND RICHLAND COUNTIES

	Rates	Fringes
BRICKLAYER	$ 30.61	14.10

BRWI0019-002 06/01/2008

BARRON, BUFFALO, BURNETT, CHIPPEWA, DUNN, EAU CLAIRE, PEPIN, PIERCE, POLK, RUSK, ST. CROIX, SAWYER AND WASHBURN COUNTIES

	Rates	Fringes
BRICKLAYER	$ 28.99	14.05

BRWI0021-002 06/01/2008

DODGE AND JEFFERSON COUNTIES

	Rates	Fringes
BRICKLAYER	$ 30.88	13.85

BRWI0034-002 06/04/2007

COLUMBIA AND SAUK COUNTIES

	Rates	Fringes
BRICKLAYER	$ 30.66	14.05

CARP0087-001 05/01/2007

BURNETT (W. of Hwy 48), PIERCE (W. of Hwy 29), POLK (W. of Hwys 35, 48 & 65), AND ST. CROIX (W. of Hwy 65) COUNTIES

	Rates	Fringes
Carpenter & Piledrivermen	$ 26.76	11.61

CARP0252-002 06/01/2008

ADAMS, BARRON, BAYFIELD (Eastern 2/3), BROWN, BUFFALO, BURNETT (E. of Hwy 48), CALUMET, CHIPPEWA, CLARK, COLUMBIA, CRAWFORD, DANE, DODGE, DOOR, DUNN, EAU CLAIRE, FLORENCE (except area bordering Michigan State Line), FOND DU LAC, FOREST, GRANT, GREEN, GREEN LAKE, IOWA, IRON, JACKSON, JEFFERSON, JUNEAU, KEWAUNEE, LA CROSSE, LAFAYETTE, LANGLADE, LINCOLN, MANITOWOC, MARATHON, MARINETTE (except N.E. corner), MARQUETTE, MENOMINEE, MONROE, OCONTO, ONEIDA, OUTAGAMIE, PEPIN, PIERCE (E. of Hwys 29 & 65), POLK (E. of Hwys 35, 48 & 65), PORTAGE, PRICE, RICHLAND, ROCK, RUSK, SAUK, SAWYER, SHAWANO, SHEBOYGAN, ST CROIX (E. of Hwy 65), TAYLOR, TREMPEALEAU, VERNON, VILAS, WALWORTH, WASHBURN, WAUPACA, WAUSHARA, WINNEBAGO, AND WOOD COUNTIES

	Rates	Fringes
CARPENTER		
CARPENTER	$ 27.51	13.36
MILLWRIGHT	$ 29.11	13.36
PILEDRIVER	$ 28.01	13.36

CARP0252-010 05/27/2007

ASHLAND COUNTY

	Rates	Fringes
Carpenters		
Carpenter	$ 23.82	11.26
Millwright	$ 27.71	11.26
Pile Driver	$ 24.81	10.43

CARP0264-003 06/01/2008

KENOSHA, MILWAUKEE, OZAUKEE, RACINE, WAUKESHA, AND WASHINGTON COUNTIES

	Rates	Fringes
CARPENTER	$ 30.52	14.41

CARP0361-004 05/01/2008

BAYFIELD (Western 1/3) AND DOUGLAS COUNTIES

	Rates	Fringes
CARPENTER	$ 29.77	13.40

CARP2337-001 06/01/2008

ZONE A: MILWAUKEE, OZAUKEE, WAUKESHA AND WASHINGTON

ZONE B: KENOSHA & RACINE

	Rates	Fringes
PILEDRIVERMAN		
Zone A	$ 27.25	19.46
Zone B	$ 24.47	19.46

CARP2337-003 06/02/2008

	Rates	Fringes
MILLWRIGHT		
Zone A	$ 27.92	19.08
Zone B	$ 26.82	19.08

ZONE DEFINITIONS

ZONE A: MILWAUKEE, OZAUKEE, WAUKESHA AND WASHINGTON COUNTIES

ZONE B: KENOSHA & RACINE COUNTIES

ELEC0014-002 06/01/2007

ASHLAND, BARRON, BAYFIELD, BUFFALO, BURNETT, CHIPPEWA, CLARK (except Maryville, Colby, Unity, Sherman, Fremont, Lynn & Sherwood), CRAWFORD, DUNN, EAU CLAIRE, GRANT, IRON, JACKSON, LA CROSSE, MONROE, PEPIN, PIERCE, POLK, PRICE, RICHLAND, RUSK, ST CROIX, SAWYER, TAYLOR, TREMPEALEAU, VERNON, AND WASHBURN COUNTIES

	Rates	Fringes

Electricians:.....$ 28.91 27.8%+6.60

ELEC0127-002 06/01/2008

KENOSHA COUNTY

	Rates	Fringes
Electricians:	$ 33.59	28%+7.56

ELEC0158-002 06/01/2007

BROWN, DOOR, KEWAUNEE, MANITOWOC (except Schleswig), MARINETTE(Wausuakee and area South thereof), OCONTO, MENOMINEE (East of a ine 6 miles West of the West boundary of Oconto County), SHAWANO (Except Area North of Townships of Aniwa and Hutchins) COUNTIES

	Rates	Fringes
Electricians:	$ 26.75	26.75%+7.12

ELEC0159-003 06/01/2008

COLUMBIA, DANE, DODGE (Area West of Hwy 26, except Chester and Emmet Townships), GREEN, LAKE (except Townships of Berlin, Seneca, and St. Marie), IOWA, MARQUETTE (except Townships of Neshkoka, Crystal Lake, Newton, and Springfield), and SAUK COUNTIES

	Rates	Fringes
Electricians:	$ 31.00	3%+15.77

ELEC0219-004 06/02/2008

FLORENCE COUNTY (Townships of Aurora, Commonwealth, Fern, Florence and Homestead) AND MARINETTE COUNTY (Township of Niagara)

	Rates	Fringes
Electricians:		
Electrical contracts over $90,000	$ 27.61	15.03
Electrical contracts under $90,000	$ 25.42	14.96

ELEC0242-005 06/02/2008

DOUGLAS COUNTY

	Rates	Fringes
Electricians:	$ 31.08	59.25%

ELEC0388-002 03/01/2007

ADAMS, CLARK (Colby, Freemont, Lynn, Mayville, Sherman, Sherwood, Unity), FOREST, JUNEAU, LANGLADE, LINCOLN, MARATHON, MARINETTE (Area North of the town of Wausaukee), MENOMINEE (Area West of a line 6 miles West of the West boundary of

Oconto County), ONEIDA, PORTAGE, SHAWANO (Area North of the townships of Aniwa and Hutchins), VILAS AND WOOD COUNTIES

	Rates	Fringes
Electricians:	$ 27.68	15.23

ELEC0430-002 06/01/2008

RACINE COUNTY (Except Burlington Township)

	Rates	Fringes
Electricians:	$ 32.212	17.18

ELEC0494-005 06/01/2008

MILWAUKEE, OZAUKEE, WASHINGTON, AND WAUKESHA COUNTIES

	Rates	Fringes
Electricians:	$ 31.14	14.85%+$13.95

ELEC0494-006 06/01/2008

CALUMET (Township of New Holstein), DODGE (East of Hwy 26 including Chester Township), FOND DU LAC, MANITOWOC (Schleswig), and SHEBOYGAN COUNTIES

	Rates	Fringes
Electricians:	$ 28.33	3%+$17.21

ELEC0577-003 06/01/2008

CALUMET (except Township of New Holstein), GREEN LAKE (N. part including Townships of Berlin, St Marie, and Seneca), MARQUETTE (N. part including Townships of Crystal Lake, Neshkoro, Newton, and Springfield), OUTAGAMIE, WAUPACA, WAUSHARA, AND WINNEBAGO COUNTIES

	Rates	Fringes
Electricians:	$ 27.40	26.5%+7.65

ELEC0890-003 12/01/2007

DODGE (Emmet Township only), GREEN, JEFFERSON, LAFAYETTE, RACINE (Burlington Township), ROCK AND WALWORTH COUNTIES

	Rates	Fringes
Electricians:	$ 28.34	26.45%+8.11

ENGI0139-003 06/01/2008

REMAINING COUNTIES

	Rates	Fringes
Power Equipment Operator		
Group 1	$ 32.12	16.20
Group 2	$ 31.12	16.20

Group 3	$ 30.42	16.20
Group 4	$ 29.89	16.20
Group 5	$ 27.82	16.20
Group 6	$ 27.19	16.20

EPA PREMIUMS:
Level "A" Protection: $3.00 per hour
Level "B" Protection: $2.00 per hour
Level "C" Protection: $1.00 per hour
POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Cranes, Tower Cranes and Derricks with or without attachments with a lifting capacity of over 100 tons; Cranes, Tower Cranes, and Derricks with boom, leads and/or jib lengths 176 ft or longer.

GROUP 2: Backhoes (Excavators) weighing 130,00 lbs and over; Cranes, Tower Cranes and Derricks with or without attachments with a lifting capacity of 100 tons or less; Cranes, Tower Cranes, and Derricks with boom, leads, and/or jib lengths 175 ft or less; Caisson Rigs; Pile Driver

GROUP 3: Backhoes (Excavators) weighing under 130,000 lbs; Travelling Crane (bridge type); Milling Machine; Concrete Paver over 27 E; Concrete Spreader and Distributor; Concrete Laser Screed; Concrete Grinder and Planing Machine; Slipform Curb and Gutter Machine; Boring Machine (Directional); Dredge Operator; Skid Rigs; over 46 meter Concrete Pump.

GROUP 4: Hydraulic Backhoe (tractor or truck mounted); Hydraulic Crane, 10 tons or less; Tractor, Bulldozer, or End Loader (over 40 hp); Motor Patrol; Scraper Operator; Bituminous Plant and Paver Operator; Screed-Milling Machine; Roller over 5 tons; Concrete pumps 46 meter and under; Grout Pumps; Rotec type machine; Hydro Blaster, 10,000 psi and over; Rotary Drill Operator; Percussion Drilling Machine; Air Track Drill with or without integral hammer; Blaster; Boring Machine (vertical or horizontal); Side Boom; Trencher, wheel type or chain type having 8 inch or larger bucket; Rail Leveling Machine (Railroad); Tie Placer; Tie Extractor; Tie Tamper; Stone Leveler; Straddle Carrier; Material Hoists; Stack Hoist; Man Hoists; Mechanic and Welder; Off Road Material Haulers.

GROUP 5: Tractor, Bulldozer, or Endloader (under 40 hp); Tampers -Compactors, riding type; Stump Chipper, large; Roller, Rubber Tire; Backfiller; Trencher, chain type (bucket under 8 inch); Concrete Auto Breaker, large; Concrete Finishing Machine (road type); Concrete Batch Hopper; Concrete Conveyor Systems; Concrete Mixers, 14S or over; Pumps, Screw Type and Gypsum); Hydrohammers, small; Brooms and Sweeeprs; Lift Slab Machine; Roller under 5 tons; Industrial Locomotives; Fireman (Pile Drivers and Derricks); Pumps (well points); Hoists, automatic; A-Frames and Winch Trucks; Hoists (tuggers); Boats (Tug, Safety, Work Barges and Launches); Assistant Engineer

GROUP 6: Shouldering Machine Operator; Farm or Industrial Tractor mounted equipment; Post Hole Digger; Auger (vertical and horizontal); Skid Steer Loader with or without attachments; Robotic Tool Carrier with or without attachments; Power Pack Vibratory/Ultra Sound Driver and

Extractor; Fireman (Asphalt Plants); Screed Operator; Stone Crushers and Screening Plants; Air, Electric, Hydraulic Jacks (Slip Form); Prestress Machines; Air Compressor, 400 CFM or over; Refrigeration Plant/Freese Machine; Boiler Operators (temporary heat); Forklifts; Welding Machines; Generators; Pumps over 3"; Heaters, Mechanical; Combination small equipment operator; Winches, small electric; Oiler; Greaser; Rotary Drill Tender; Conveyor; Elevator Operator

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ENGI0139-007 06/02/2008

DODGE, FOND DU LAC, JEFFERSON, KENOSHA, MILWAUKEE, OZAUKEE, RACINE, SHEBOYGAN, WALWORTH, WASHINGTON, AND WAUKESHA COUNTIES

	Rates	Fringes
Power Equipment Operator		
Group 1	$ 31.39	16.40
Group 2	$ 30.61	16.40
Group 3	$ 29.66	16.40
Group 4	$ 28.61	16.40
Group 5	$ 27.21	16.40

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Cranes, Tower Cranes, and Derricks with or without attachments, with a lifting capacity of over 100 tons; or Cranes, Tower Cranes, and Derricks with boom, leads, and/or jib lengths measuring 176 feet or longer; Backhoes (Excavators) 130,000 lbs and over; Caisson Rigs and Pile Drivers

GROUP 2: Cranes, Tower Cranes and Derricks with or without attachments with a lifting capacity of 100 tons or under; or Cranes, Tower Cranes, and Derricks with boom, lead, and\or jib lengths measuring 175 feet or under; Backhoes (Excavators) under 130,000 lbs; Skid Rigs; Dredge Operator: Traveling Crane (Bridge type); Concrete Paver over 27 E; Concrete Spreader and Distributor; Concrete Pumps and Boring Machines (directional)

GROUP 3: Material Hoists; Stack Hoists; Tractor or Truck mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane, 5 tons or under; Manhoist; Tractor over 40 hp; Bulldozer over 40 hp; Endloader over 40 hp; Forklift, 25 ft and over; Motor Patrol; Scraper Operator; Sideboom; Straddle Carrier; Mechanic and Welder; Bituminous Plant and Paver Operator; Roller over 5 tons; Percussion Drill Operator; Rotary Drill Operator; Blaster; Air Track Drill; Trencher (wheel type or chain type having over 8 inch bucket); Elevator; Milling Machine and Boring Machine (horizontal or vertical); Backhoe Mounted Compactor

GROUP 4: Backfiller; Concrete Auto Breaker (large); Concrete Finishing Machine (road type); Roller, Rubber Tire; Concrete Batch Hopper; Concrete Conveyor System; Concrete Mixers (14S or over); Screw type Pumps and Gypsum Pumps; Grout Pumps; Tractor, Bulldozer, End Loader, under 40 hp; Pumps (well points); Trencher (chain type 8 inch or smaller bucket; Industrial Locomotives; Roller under 5 tons; Fireman (Piledrivers and Derricks); Robotic Tool Carrier with or without attachments.

GROUP 5: Hoists (Automatic); Forklift, 12 ft to 25 ft; Tamper-Compactors, riding type; A-Frame andWinch Trucks; Concrete Auto Breaker; Hydrohammer, small; Brooms and Sweepers; Hoist (Tuggers); Stump Chipper, large; Boats (Tug, Safety, Work Barges and Launch); Shouldering Machine Operator; Screed Operator; Farm or Industrial Tractor; Post Hole Digger; Stone Crushers and Screening Plants; Firemen (Asphalt Plants); Air Compressor (400 CFM or over); Augers (vertical and horizontal); Generators, 150 KW and over; Air, Electric Hydraulic Jacks (Slipform); Prestress Machines; Skid Steer Loader with or without attachments; Boiler operators (temporary heat); Forklift, 12 ft and under; Screed Operator Milling Machine; Refrigeration Plant/Freeze Machine; Power Pack Vibratory/Ultra Sound Driver and Extractor; Generators under 150 KW; Combination small equipment operator; Compressors under 400 CFM; Welding Machines; Heaters, Mechanical; Pumps; Winches, Small Electric; Oiler and Greaser; Conveyor; High pressure utility locating machine (daylighting machine).

IRON0008-002 06/01/2008

BROWN, CALUMET, DOOR, FOND DU LAC, KEWAUNEE, MANITOWOC, MARINETTE, OCONTO, OUTAGAMI, SHAWANO, SHEBOYGAN, AND WINNEBAGO COUNTIES:

	Rates	Fringes
IRONWORKER	$ 27.73	19.04

IRON0008-003 06/01/2008

KENOSHA, MILWAUKEE, OZAUKEE, RACINE, WALWORTH (N.E. 2/3), WASHINGTON, AND WAUKESHA COUNTIES

	Rates	Fringes
IRONWORKER	$ 30.06	19.04

IRON0383-001 06/01/2008

ADAMS, COLUMBIA, CRAWFORD, DANE, DODGE, FLORENCE, FOREST, GRANT, GREENE, (Excluding S.E. tip), GREEN LAKE, IOWA, JEFFERSON, JUNEAU, LA CROSSE, LAFAYETTE, LANGLADE, MARATHON, MARQUETTE, MENOMINEE, MONROE, PORTAGE, RICHLAND, ROCK (Northern area, vicinity of Edgerton and Milton), SAUK, VERNON, WAUPACA, WAUSHARA, AND WOOD COUNTIES

	Rates	Fringes
IRONWORKER	$ 30.30	15.73

IRON0498-005 06/01/2008

GREEN (S.E. 1/3), ROCK (South of Edgerton and Milton), and WALWORTH (S.W. 1/3) COUNTIES:

	Rates	Fringes
IRONWORKER	$ 34.34	25.72

IRON0512-008 05/01/2008

BARRON, BUFFALO, CHIPPEWA, CLARK, DUNN, EAU CLAIRE, JACKSON, PEPIN, PIERCE, POLK, RUSK, ST CROIX, TAYLOR, AND TREMPEALEAU COUNTIES

	Rates	Fringes
IRONWORKER	$ 32.80	19.42

IRON0512-021 05/01/2008

ASHLAND, BAYFIELD, BURNETT, DOUGLAS, IRON, LINCOLN, ONEIDA, PRICE, SAWYER, VILAS AND WASHBURN COUNTIES

	Rates	Fringes
IRONWORKER	$ 28.66	18.50

LABO0113-004 06/04/2007

MILWAUKEE, OZAUKEE, WASHINGTON, AND WAUKESHA COUNTIES

	Rates	Fringes
Laborers: (Open Cut)		
Group 1	$ 13.55	12.00
Group 2	$ 15.25	12.00
Group 3	$ 24.92	12.00
Group 4	$ 25.04	12.00
Group 5	$ 25.09	12.00
Group 6	$ 26.74	12.00
Group 7	$ 28.87	12.00
Group 8	$ 29.33	12.00

LABORERS CLASSIFICATIONS [OPEN CUT]

GROUP 1: Yard Laborer

GROUP 2: Landscaper

GROUP 3: Paving Laborer

GROUP 4: General Laborer on Surface; Top Man

GROUP 5: Mud Mixer

GROUP 6: Mucker; Form Stripper; Bottom Digger and Misc; Bottom Man and Welder on Surface

GROUP 7: Concrete Manhole Builder; Caisson Worker; Miner; Pipe Layer; Rock Driller and Joint Man; Timber Man and Concrete Brusher; Bracer in Trench Behind Machine & Tight Sheeting; Concrete Formsetter and Shoveler; Jackhammer Operator

GROUP 8: Blaster

NOTE: Hazardous & Toxic Waste Removal: add $0.15 per hour.

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* LABO0113-005 06/01/2008

SEWER, TUNNEL & UNDERGROUND

KENOSHA AND RACINE COUNTIES

	Rates	Fringes
Laborers:		
Group 1	$ 18.48	13.31
Group 2	$ 23.09	13.31
Group 3	$ 25.07	13.31
Group 4	$ 26.47	13.31

FOR ALL TUNNEL WORK UNDER COMPRESSED AIR: 0-15 lbs add $1.00, 15-30 lbs add $2.00, over 30 lbs add $3.00

LABORERS CLASSIFICATIONS

GROUP 1: Flagperson

GROUP 2: General Laborer, Landscaper, Wellpoint Installation, Wire Mesh and Reinforcement, Concrete Worker, Form Stripper, Strike-off Worker

GROUP 3: Machine and Equipment Operator, Sheeting, Form Setting, Patch Finisher,Bottom Man, Joint Sawer, Gunnite Man, Manhole Builder, Welder-Torchman, Blaster, Caulker, Bracer, Bull Float, Conduit Worker, Mucker and Car Pusher, Raker and Luteman, Hydraulic Jacking of Shields, Shield Drivers, Mining Machine, Lock Tenders, Mucking Machine Operator, Motor Men & Gauge Tenders and operation of incidental Mechanical Equipment and all Power Driven Tools

GROUP 4: Pipelayer, Miner and Laser Operator

LABO0113-008 06/04/2007

MILWAUKEE, OZAUKEE, WASHINGTON & WAUKESHA COUNTIES

	Rates	Fringes
Laborers: (Tunnel-Free Air)		
Group 1	$ 25.04	12.00
Group 2	$ 25.09	12.00
Group 3	$ 26.74	12.00
Group 4	$ 26.84	12.00
Group 5	$ 28.87	12.00
Group 6	$ 29.33	12.00

LABORERS CLASSIFICATIONS [TUNNEL - FREE AIR]:

GROUP 1: General Laborer on surface; Tower Man

GROUP 2: Saw Man; Top Man

GROUP 3: Form Stripper; Car Pusher

GROUP 4: Mucker; Dinkey; Welder (rate on surface)

GROUP 5: Concrete Manhole Builder; Mucking Machine; Miner; Mining Machine; Welder; Rock Driller; Concrete Buster; Jack Hammer Operator; Caisson Worker; Pipelayer and Joint Man; Bracerman; Nozzle Man on Gunnite; Timber Man; Concrete Brusher

GROUP 6: Blaster

NOTE: Hazardous & Toxic Waste Removal: add $0.15 per hour.

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* LABO0113-009 06/04/2007

MILWAUKEE, OZAUKEE, WASHINGTON & WAUKESHA COUNTIES

	Rates	Fringes
Laborers: (Tunnel -		
*COMPRESSED AIR 0 - 15 lbs.)		
Group 1	$ 25.04	12.00
Group 2	$ 27.15	12.00
Group 3	$ 27.74	12.00
Group 4	$ 27.84	12.00
Group 5	$ 29.87	12.00
Group 6	$ 30.33	12.00

LABORERS CLASSIFICATIONS [TUNNEL - COMPRESSED AIR]:

*Compressed Air 15 - 30 lbs add $2.00 to all classifications
*Compressed Air over 30 lbs add $3.00 to all classifcations

GROUP 1: General Laborer on surface

GROUP 2: Lock Tender on surface

GROUP 3: Form Stripper; Car Pusher

GROUP 4: Mucker; Dinkey

GROUP 5: Mucking Machine; Miner; Mining Machine; Welder & Rock Driller; Lock Tender in tunnel; Concrete Buster; Jack Hammer Operator; Caisson Worker; Pielayer and Joint Man; Bracerman; Nozzle Man on Gunite; Timber Man; Concrete Brusher;

GROUP 6: Blaster

NOTE: Hazardous & Toxic Waste Removal: add $0.15 per hour.

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* LABO0140-005 06/01/2008

ADAMS, ASHLAND, BARRON, BROWN, BUFFALO, CALUMET, CHIPPEWA, CLARK, COLUMBIA, CRAWFORD, DODGE, DOOR, DUNN, EAU CLAIRE, FLORENCE,FOND DU LAC, FOREST, GRANT, GREEN, GREEN LAKE, IOWA, JACKSON, JEFFERSON, JUNEAU, LACROSSE, LAFAYETTE, LANGLADE, LINCOLN, MANITOWOC, MARATHON, MARINETTE, MARQUETTE, MENOMINEE, MONROE, OCONTO, ONEIDA, OUTAGAMIE, PEPIN, PIERCE, POLK, PORTAGE, PRICE, RICHLAND, ROCK, RUSK, ST CROIX, SAUK, SAWYER, SHAWANO, SHEBOYGAN, TAYLOR, TREMMPEALEAU, VERNON, VILAS, WALWWORTH, WASHBURN, WAUPACA, WAUSHARA, WINNEBAGO, AND WOOD COUNTIES

	Rates	Fringes
LABORER (SEWER & WATER)		
Group 1	$ 21.18	11.74
Group 2	$ 23.03	11.74
Group 3	$ 23.23	11.74
Group 4	$ 23.58	11.74

FOR ALL TUNNEL WORK UNDER COMPRESSED AIR: 0-15 lbs add $1.00,

15-30 lbs add $2.00, over 30 lbs add $3.00

LABORERS CLASSIFICATIONS:

GROUP 1: Flagperson

GROUP 2: General Laborer, Wellpoint Installation; Form Stripper; Strike Off worker

GROUP 3: Sheeting Formsetting; Patch Finisher; Bottom Man; Joint Sawer; Gunnite Man; Manhole Builder; Welder; Torchman; Blaster; Caulker Bracer; Bull Float; Mucker and Car Pusher; Raker and Luteman; Hydraulic jacking of shields, Shield Drivers; Mining Machine; Lock Tenders; Mucking Machine Operators; Motor Men and Gauge Tenders; Power Tool Operators

GROUP 4: Pipelayer, Miner, and Laser Operator

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* LABO0464-002 06/01/2008

DANE AND DOUGLAS COUNTIES

	Rates	Fringes
Laborers:		
Group 1	$ 21.88	11.74
Group 2	$ 24.08	11.74
Group 3	$ 24.28	11.74
Group 4	$ 24.63	11.74

FOR ALL TUNNEL WORK UNDER COMPRESSED AIR: 0 - 15 lbs add $1.00, 15- 30 lbs add $2.00, over 30 lbs add $3.00

LABORERS CLASSIFICATIONS:

GROUP 1: Flagperson

GROUP 2: General Laborer; Wellpoint Installation; Concrete Worker; Form Stripper; Strike Off worker

GROUP 3: Sheeting Formsetting; Patch Finisher; Bottom Man; Joint Sawer; Gunnite Man; Manhole Builder; Welder; Torchman; Blaster; Caulker Bracer; Bull Float; Mucker and Car Pusher; Raker and Luteman; Hydraulic jacking of shields, Shield Dirvers; Mining Machine; Lock Tenders; Mucking Machine Operators; Motor Men and Gauge Tenders; Power Tool Operators

GROUP 4: Pipelayer, Miner, and Laser Operator

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* LABO1091-010 06/01/2008

BAYFIELD, BURNETT, IRON, SAWYER, AND WASHBURN COUNTIES

	Rates	Fringes
Laborers: (SEWER & WATER)		
Group 1	$ 21.67	11.74
Group 2	$ 23.73	11.74
Group 3	$ 23.93	11.74
Group 4	$ 24.28	11.74

FOR ALL TUNNEL WORK UNDER COMPRESSED AIR:
0 - 15 lbs add $1.00, 15-30 lbs add $2.00, over 30 lbs add $3.00

LABORERS CLASSIFICATIONS:

GROUP 1: Flagperson

GROUP 2: Laborers, Wellpoint Installation; Form Stripper; Strike Off worker

GROUP 3: Sheeting Formsetting; Patch Finisher; Bottom Man; Joint Sawer; Gunnite Man; Manhole Builder; Welder; Torchman; Blaster; Caulker Bracer; Bull Float; Mucker and Car Pusher; Raker and Luteman; Hydraulic jacking of shields, Shield Dirvers; Mining Machine; Lock Tenders; Mucking Machine Operators; Motor Men and Gauge Tenders; Power Tool Operators

GROUP 4: Pipelayer, Miner, and Laser Operator

PLAS0599-010 06/01/2007

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER		
Area 1	$ 28.27	12.73
Area 2 (BAC)	$ 28.15	12.80
Area 3	$ 26.10	13.65
Area 4	$ 26.82	12.93
Area 5	$ 26.97	12.78
Area 6	$ 24.08	15.67

AREA DESCRIPTIONS

AREA 1: BAYFIELD, DOUGLAS, PRICE, SAWYER, AND WASHBURN COUNTIES

AREA 2: ADAMS, ASHLAND, BARRON, BROWN, BURNETT, CALUMET, CHIPPEWA, CLARK, COLUMBIA, DODGE, DOOR, DUNN, FLORENCE, FOND DU LAC, FOREST, GREEN LAKE, IRON, JEFFERSON, KEWAUNEE, LANGLADE, LINCOLN, MANITOWOC, MARATHON, MARINETTE, MARQUETTE, MENOMINEE, OCONTO, ONEIDA, OUTAGAMIE, POLK, PORTAGE, RUSK, ST CROIX, SAUK, SHAWANO, SHEBOYGAN, TAYLOR, VILAS, WALWORTH, WAUPACA, WAUSHARA, WINNEBAGO, AND WOOD COUNTIES

AREA 3: BUFFALO, CRAWFORD, EAU CLAIRE, JACKSON, JUNEAU, LA CROSSE MONROE, PEPIN, PIERCE, RICHLAND, TREMPEALEAU, AND VERNON COUNTIES

AREA 4: MILWAUKEE, OZAUKEE, WASHINGTON, AND WAUKESHA COUNTIES

AREA 5: DANE, GRANT, GREEN, IOWA, LAFAYETTE, AND ROCK COUNTIES

AREA 6: KENOSHA AND RACINE COUNTIES

TEAM0039-001 05/01/2008

	Rates	Fringes

TRUCK DRIVER		
1 & 2 Axles	$ 22.59	14.30
3 or more Axles; Euclids Dumptor & Articulated,		
Truck Mechanic	$ 22.74	14.30
WELL DRILLER	$ 16.52	3.70

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

In the listing above, the "SU" designation means that rates listed under the identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator

U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

GENERAL DECISION: WI20080019 03/13/2009 WI19

Date: March 13, 2009
General Decision Number: WI20080019 03/13/2009

Superseded General Decision Number: WI20070019

State: Wisconsin

Construction Type: Heavy

Counties: Wisconsin Statewide.

HEAVY CONSTRUCTION PROJECTS (Excluding Tunnel, Sewer, and Water Lines), AND HOPPER DREDGE PROJECTS

Modification Number	Publication Date
0	02/08/2008
1	02/29/2008
2	05/02/2008
3	06/13/2008
4	06/27/2008
5	07/11/2008
6	07/25/2008
7	08/08/2008
8	08/15/2008
9	08/22/2008
10	08/29/2008
11	09/12/2008
12	10/03/2008
13	11/07/2008
14	12/19/2008
15	02/20/2009
16	03/13/2009

BOIL0107-001 07/01/2007

	Rates	Fringes
BOILERMAKER		
Boilermaker	$ 30.69	18.12
Small Boiler Repair (under 25,000 lbs/hr)	$ 24.55	13.10

BRWI0001-002 06/01/2008

CRAWFORD, JACKSON, JUNEAU, LA CROSSE, MONROE, TREMPEALEAU, AND VERNON COUNTIES

	Rates	Fringes
BRICKLAYER	$ 29.24	13.80

BRWI0002-002 06/01/2008

ASHLAND, BAYFIELD, DOUGLAS, AND IRON COUNTIES

	Rates	Fringes
BRICKLAYER	$ 35.24	13.35

BRWI0002-005 06/01/2008

ADAMS, ASHLAND, BARRON, BROWN, BURNETT, CALUMET, CHIPPEWA, CLARK, COLUMBIA, DODGE, DOOR, DUNN, FLORENCE, FOND DU LAC, FOREST, GREEN LAKE, IRON, JEFFERSON, KEWAUNEE, LANGLADE, LINCOLN, MANITOWOC, MARATHON, MARINETTE, MARQUETTE, MENOMINEE, OCONTO, ONEIDA, OUTAGAMIE, POLK, PORTAGE, RUSK, ST CROIX, SAUK, SHAWANO, SHEBOYGAN, TAYLOR, VILAS, WALWORTH, WAUPACA, WAUSHARA, WINNEBAGO, AND WOOD COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 28.15	12.80

BRWI0003-002 06/01/2008

BROWN, DOOR, FLORENCE, KEWAUNEE, MARINETTE, AND OCONTO COUNTIES

	Rates	Fringes
BRICKLAYER	$ 29.24	13.80

BRWI0004-002 06/01/2008

KENOSHA, RACINE, AND WALWORTH COUNTIES

	Rates	Fringes
BRICKLAYER	$ 32.88	14.50

BRWI0006-002 06/01/2008

ADAMS, CLARK, FOREST, LANGLADE, LINCOLN, MARATHON, MENOMINEE, ONEIDA, PORTAGE, PRICE, TAYLOR, VILAS AND WOOD COUNTIES

	Rates	Fringes
BRICKLAYER	$ 29.74	13.30

BRWI0007-002 06/01/2008

GREEN, LAFAYETTE, AND ROCK COUNTIES

	Rates	Fringes
BRICKLAYER	$ 30.41	14.30

BRWI0008-002 06/01/2008

MILWAUKEE, OZAUKEE, WASHINGTON, AND WAUKESHA COUNTIES

	Rates	Fringes
BRICKLAYER	$ 32.71	14.54

BRWI0009-001 06/01/2008

GREEN LAKE, MARQUETTE, OUTAGAMIE, SHAWANO, WAUPACA, WASHARA, AND WINNEBAGO COUNTIES

	Rates	Fringes
BRICKLAYER	$ 29.24	13.80

BRWI0011-002 06/01/2008

CALUMET, FOND DU LAC, MANITOWOC, AND SHEBOYGAN COUNTIES

	Rates	Fringes
BRICKLAYER	$ 29.24	13.80

BRWI0013-002 06/01/2008

DANE, GRANT, IOWA, AND RICHLAND COUNTIES

	Rates	Fringes
BRICKLAYER	$ 30.61	14.10

BRWI0019-002 06/01/2008

BARRON, BUFFALO, BURNETT, CHIPPEWA, DUNN, EAU CLAIRE, PEPIN, PIERCE, POLK, RUSK, ST. CROIX, SAWYER AND WASHBURN COUNTIES

	Rates	Fringes
BRICKLAYER	$ 28.99	14.05

BRWI0021-002 06/01/2008

DODGE AND JEFFERSON COUNTIES

	Rates	Fringes
BRICKLAYER	$ 30.88	13.85

BRWI0034-002 06/04/2007

COLUMBIA AND SAUK COUNTIES

	Rates	Fringes
BRICKLAYER	$ 30.66	14.05

CARP0087-001 05/01/2007

BURNETT (W. of Hwy 48), PIERCE (W. of Hwy 29), POLK (W. of Hwys 35, 48 & 65), AND ST. CROIX (W. of Hwy 65) COUNTIES

	Rates	Fringes
Carpenter & Piledrivermen	$ 26.76	11.61

CARP0252-002 06/01/2008

ADAMS, BARRON, BAYFIELD (Eastern 2/3), BROWN, BUFFALO, BURNETT (E. of Hwy 48), CALUMET, CHIPPEWA, CLARK, COLUMBIA, CRAWFORD, DANE, DODGE, DOOR, DUNN, EAU CLAIRE, FLORENCE (except area bordering Michigan State Line), FOND DU LAC, FOREST, GRANT, GREEN, GREEN LAKE, IOWA, IRON, JACKSON, JEFFERSON, JUNEAU, KEWAUNEE, LA CROSSE, LAFAYETTE, LANGLADE, LINCOLN, MANITOWOC, MARATHON, MARINETTE (except N.E. corner), MARQUETTE, MENOMINEE, MONROE, OCONTO, ONEIDA, OUTAGAMIE, PEPIN, PIERCE (E. of Hwys 29 & 65), POLK (E. of Hwys 35, 48 & 65), PORTAGE, PRICE, RICHLAND, ROCK, RUSK, SAUK, SAWYER, SHAWANO, SHEBOYGAN, ST CROIX (E. of Hwy 65), TAYLOR, TREMPEALEAU, VERNON, VILAS, WALWORTH, WASHBURN, WAUPACA, WAUSHARA, WINNEBAGO, AND WOOD COUNTIES

	Rates	Fringes
CARPENTER		
CARPENTER	$ 27.51	13.36
MILLWRIGHT	$ 29.11	13.36
PILEDRIVER	$ 28.01	13.36

CARP0252-010 05/27/2007

ASHLAND COUNTY

	Rates	Fringes
Carpenters		
Carpenter	$ 23.82	11.26
Millwright	$ 27.71	11.26
Pile Driver	$ 24.81	10.43

CARP0264-003 06/01/2008

KENOSHA, MILWAUKEE, OZAUKEE, RACINE, WAUKESHA, AND WASHINGTON COUNTIES

	Rates	Fringes
CARPENTER	$ 30.52	14.41

CARP0361-004 05/01/2008

BAYFIELD (Western 1/3) AND DOUGLAS COUNTIES

	Rates	Fringes
CARPENTER	$ 29.77	13.40

CARP2337-001 06/01/2008

ZONE A: MILWAUKEE, OZAUKEE, WAUKESHA AND WASHINGTON

ZONE B: KENOSHA & RACINE

	Rates	Fringes
PILEDRIVERMAN		
Zone A	$ 27.25	19.46
Zone B	$ 24.47	19.46

CARP2337-003 06/02/2008

	Rates	Fringes
MILLWRIGHT		
Zone A	$ 27.92	19.08
Zone B	$ 26.82	19.08

ZONE DEFINITIONS

ZONE A: MILWAUKEE, OZAUKEE, WAUKESHA AND WASHINGTON COUNTIES

ZONE B: KENOSHA & RACINE COUNTIES

ELEC0014-002 06/01/2007

ASHLAND, BARRON, BAYFIELD, BUFFALO, BURNETT, CHIPPEWA, CLARK

(except Maryville, Colby, Unity, Sherman, Fremont, Lynn & Sherwood), CRAWFORD, DUNN, EAU CLAIRE, GRANT, IRON, JACKSON, LA CROSSE, MONROE, PEPIN, PIERCE, POLK, PRICE, RICHLAND, RUSK, ST CROIX, SAWYER, TAYLOR, TREMPEALEAU, VERNON, AND WASHBURN COUNTIES

	Rates	Fringes
Electricians:	$ 28.91	27.8%+6.60

ELEC0127-002 06/01/2008

KENOSHA COUNTY

	Rates	Fringes
Electricians:	$ 33.59	28%+7.56

ELEC0158-002 06/01/2007

BROWN, DOOR, KEWAUNEE, MANITOWOC (except Schleswig), MARINETTE(Wausuakee and area South thereof), OCONTO, MENOMINEE (East of a ine 6 miles West of the West boundary of Oconto County), SHAWANO (Except Area North of Townships of Aniwa and Hutchins) COUNTIES

	Rates	Fringes
Electricians:	$ 26.75	26.75%+7.12

ELEC0159-003 06/01/2008

COLUMBIA, DANE, DODGE (Area West of Hwy 26, except Chester and Emmet Townships), GREEN, LAKE (except Townships of Berlin, Seneca, and St. Marie), IOWA, MARQUETTE (except Townships of Neshkoka, Crystal Lake, Newton, and Springfield), and SAUK COUNTIES

	Rates	Fringes
Electricians:	$ 31.00	3%+15.77

ELEC0219-004 06/02/2008

FLORENCE COUNTY (Townships of Aurora, Commonwealth, Fern, Florence and Homestead) AND MARINETTE COUNTY (Township of Niagara)

	Rates	Fringes
Electricians:		
Electrical contracts over $90,000	$ 27.61	15.03
Electrical contracts under $90,000	$ 25.42	14.96

ELEC0242-005 06/02/2008

DOUGLAS COUNTY

	Rates	Fringes
Electricians:	$ 31.08	59.25%

ELEC0388-002 03/01/2007

ADAMS, CLARK (Colby, Freemont, Lynn, Mayville, Sherman, Sherwood, Unity), FOREST, JUNEAU, LANGLADE, LINCOLN, MARATHON, MARINETTE (Area North of the town of Wausaukee), MENOMINEE (Area West of a line 6 miles West of the West boundary of Oconto County), ONEIDA, PORTAGE, SHAWANO (Area North of the townships of Aniwa and Hutchins), VILAS AND WOOD COUNTIES

	Rates	Fringes
Electricians:	$ 27.68	15.23

ELEC0430-002 06/01/2008

RACINE COUNTY (Except Burlington Township)

	Rates	Fringes
Electricians:	$ 32.212	17.18

ELEC0494-005 06/01/2008

MILWAUKEE, OZAUKEE, WASHINGTON, AND WAUKESHA COUNTIES

	Rates	Fringes
Electricians:	$ 31.14	14.85%+$13.95

ELEC0494-006 06/01/2008

CALUMET (Township of New Holstein), DODGE (East of Hwy 26 including Chester Township), FOND DU LAC, MANITOWOC (Schleswig), and SHEBOYGAN COUNTIES

	Rates	Fringes
Electricians:	$ 28.33	3%+$17.21

ELEC0577-003 06/01/2008

CALUMET (except Township of New Holstein), GREEN LAKE (N. part including Townships of Berlin, St Marie, and Seneca), MARQUETTE (N. part including Townships of Crystal Lake, Neshkoro, Newton, and Springfield), OUTAGAMIE, WAUPACA, WAUSHARA, AND WINNEBAGO COUNTIES

	Rates	Fringes
Electricians:	$ 27.40	26.5%+7.65

ELEC0890-003 12/01/2007

DODGE (Emmet Township only), GREEN, JEFFERSON, LAFAYETTE, RACINE (Burlington Township), ROCK AND WALWORTH COUNTIES

	Rates	Fringes
Electricians:	$ 28.34	26.45%+8.11

ELEC0953-001 06/01/2006

	Rates	Fringes

Line Construction:

(1) Lineman	$ 31.66	4.75+29%
(2) Heavy Equipment Operator	$ 28.49	4.75+29%
(3) Equipment Operator	$ 25.33	4.75+29%
(4) Heavy Groundman Driver	$ 22.16	4.75+29%
(5) Light Groundman Driver	$ 20.58	4.75+29%
(6) Groundsman	$ 17.41	4.75+29%

ENGI0139-001 06/01/2008

KENOSHA, MILWAUKEE, OZAUKEE, RACINE, WASHINGTON, AND WAUKESHA COUNTIES

	Rates	Fringes
Power Equipment Operator		
Group 1	$ 35.26	16.60
Group 2	$ 34.76	16.60
Group 3	$ 34.26	16.60
Group 4	$ 33.97	16.60
Group 5	$ 32.09	16.60
Group 6	$ 26.94	16.60

EPA PREMIUMS:
Level "A" Protection: $3.00 per hour
Level "B" Protection: $2.00 per hour
Level "C" Protection: $1.00 per hour

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Cranes, Tower Cranes, Pedestal Tower Cranes and Derricks with or w/o attachments with a lifting capacity of over 100 tons; or Cranes, Tower Cranes, Pedestal Tower Cranes and Derricks with boom, leads, and/or jib lengths measuring 176 feet or longer; Self-Erecting Tower Cranes over 4000 lbs lifting capacity; All Cranes with Boom Dollies; Boring Machines (directional); Master Mechanic. $0.50 additional per hour per 100 tons or 100 ft of boom over 200 ft or lifting capacity of crane over 200 tons to a maximum of 300 tons or 300 ft. Thereafter an increase of $0.01 per ft or ton, whichever is greater.

GROUP 2: Cranes, Tower Cranes, Pedestal Tower Cranes and Derricks with or without attachments with a lifting capacity of 100 tons or less; or Cranes, Tower Cranes Portable Tower Cranes, Pedestal Tower Cranes and Derricks with boom, leadsand/or jib lengths measuring 175 feet or less; Backhoes (excavators) 130,000 lbs and over; Caisson Rigs; Pile Drivers; Boring Machines (vertical or horizontal), Versi-Lift, Tri-Lift, Gantry 20,000 lbs & over.

GROUP 3: Backhoe (excavator) under 130,000 lbs;Self-erecting Tower Crane 4000 lbs & under lifting capacity;Traveling Crane (bridge type); Skid Rigs; Dredge Operator; Mechanic; Concrete Paver (over 27E); Concrete Spreader and Distributor; Forklift/ Telehandler (machinery- moving / steel erection); Hydro Blaster, 10,000 psi and over

GROUP 4: Material Hoists; Stack Hoists; Hydraulic Backhoe (tractor or truck mounted); Hydraulic Crane, 5 tons or under (tractor or truck mounted); Hoist (tuggers 5 tons & over); Hydro-Excavators/Daylighters; Concrete Pumps Rotec type Conveyors; Tractor/Bulldozer/End Loader (over 40 hp);

Motor Patrol; Scraper Operator; Sideboom; Straddle Carrier; Welder; Bituminous Plant and Paver Operator; Roller over 5 tons; Rail Leveling Machine (Railroad); Tie Placer; Tie Extractor; Tie Tamper; Stone Leveler; Rotary Drill Operator and Blaster; Percussion Drill Operator; Air Track Drill and/or Hammers; Gantrys (under 20,000 lbs); Tencher (wheel type or chain type having 8 inch or larger bucket); Milling Machine; Off-Road Material Haulers.

GROUP 5: Backfiller; Concrete Auto Breaker (large); Concrete Finishing Machines (road type); Rubber Tired Roller; Concrete Batch Hopper; Concrete Conveyor Systems; Grout Pumps; Concrete Mixers (14S or over); Screw Type Pumps and Gypsum Pumps; Tractor, Bulldozer, End Loader (under 40 hp); Trencher (chain type, bucket under 8 inch); Industrial Locomotives; Rollers under 5 tons; Stump Grinder/Chipper (Large); Timber Equipment; Firemen (pile drivers and derricks); Personnel Hoist, Telehandler over 8000 lbs; Robotic Tool Carrier with or without attachments

GROUP 6: Tampers - Compactors (riding type); Assistant Engineer; A-Frames and Winch Trucks; Concrete Auto Breaker; Hydrohammers (small); Brooms and Sweepers; Hoist (tuggers under 5 tons); Boats (Tug, Safety, Work Barges, Launch); Shouldering Machine Operator; Prestress Machines; Screed Operator; Stone Crushers and Screening Plants; Screed Operators (milling machine), Farm or Industrial Tractor Mounted Equipment; Post Hole Digger; Fireman (asphalt plants); Air Compressors over 400 CFM; Generators, over 150 KW; Augers (vertical and horizontal); Air, Electric, Hydraulic Jacks (slipform); Skid Steer Loaders (with or without attachments); Boiler Operators (temporary heat); Refrigeration Plant/Freeze Machines; Power Pack Vibratory/Ultra Sound Drivers and Extractors; Welding Machines; Heaters (mechanical); Pumps; Winches (small electric); Oiler and Greaser; Rotary Drill Tender; Conveyor; Forklifts/Telehandler 8000 lbs & under; Elevators: Automatic Hoists; Pumps (well points); Combination Small Equipment Operators

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ENGI0139-003 06/01/2008

REMAINING COUNTIES

	Rates	Fringes
Power Equipment Operator		
Group 1	$ 32.12	16.20
Group 2	$ 31.12	16.20
Group 3	$ 30.42	16.20
Group 4	$ 29.89	16.20
Group 5	$ 27.82	16.20
Group 6	$ 27.19	16.20

EPA PREMIUMS:
Level "A" Protection: $3.00 per hour
Level "B" Protection: $2.00 per hour
Level "C" Protection: $1.00 per hour
POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Cranes, Tower Cranes and Derricks with or without attachments with a lifting capacity of over 100 tons; Cranes, Tower Cranes, and Derricks with boom, leads and/or jib lengths 176 ft or longer.

GROUP 2: Backhoes (Excavators) weighing 130,00 lbs and over; Cranes, Tower Cranes and Derricks with or without attachments with a lifting capacity of 100 tons or less; Cranes, Tower Cranes, and Derricks with boom, leads, and/or jib lengths 175 ft or less; Caisson Rigs; Pile Driver

GROUP 3: Backhoes (Excavators) weighing under 130,000 lbs; Travelling Crane (bridge type); Milling Machine; Concrete Paver over 27 E; Concrete Spreader and Distributor; Concrete Laser Screed; Concrete Grinder and Planing Machine; Slipform Curb and Gutter Machine; Boring Machine (Directional); Dredge Operator; Skid Rigs; over 46 meter Concrete Pump.

GROUP 4: Hydraulic Backhoe (tractor or truck mounted); Hydraulic Crane, 10 tons or less; Tractor, Bulldozer, or End Loader (over 40 hp); Motor Patrol; Scraper Operator; Bituminous Plant and Paver Operator; Screed-Milling Machine; Roller over 5 tons; Concrete pumps 46 meter and under; Grout Pumps; Rotec type machine; Hydro Blaster, 10,000 psi and over; Rotary Drill Operator; Percussion Drilling Machine; Air Track Drill with or without integral hammer; Blaster; Boring Machine (vertical or horizontal); Side Boom; Trencher, wheel type or chain type having 8 inch or larger bucket; Rail Leveling Machine (Railroad); Tie Placer; Tie Extractor; Tie Tamper; Stone Leveler; Straddle Carrier; Material Hoists; Stack Hoist; Man Hoists; Mechanic and Welder; Off Road Material Haulers.

GROUP 5: Tractor, Bulldozer, or Endloader (under 40 hp); Tampers -Compactors, riding type; Stump Chipper, large; Roller, Rubber Tire; Backfiller; Trencher, chain type (bucket under 8 inch); Concrete Auto Breaker, large; Concrete Finishing Machine (road type); Concrete Batch Hopper; Concrete Conveyor Systems; Concrete Mixers, 14S or over; Pumps, Screw Type and Gypsum); Hydrohammers, small; Brooms and Sweeeprs; Lift Slab Machine; Roller under 5 tons; Industrial Locomotives; Fireman (Pile Drivers and Derricks); Pumps (well points); Hoists, automatic; A-Frames and Winch Trucks; Hoists (tuggers); Boats (Tug, Safety, Work Barges and Launches); Assistant Engineer

GROUP 6: Shouldering Machine Operator; Farm or Industrial Tractor mounted equipment; Post Hole Digger; Auger (vertical and horizontal); Skid Steer Loader with or without attachments; Robotic Tool Carrier with or without attachments; Power Pack Vibratory/Ultra Sound Driver and Extractor; Fireman (Asphalt Plants); Screed Operator; Stone Crushers and Screening Plants; Air, Electric, Hydraulic Jacks (Slip Form); Prestress Machines; Air Compressor, 400 CFM or over; Refrigeration Plant/Freese Machine; Boiler Operators (temporary heat); Forklifts; Welding Machines; Generators; Pumps over 3"; Heaters, Mechanical; Combination small equipment operator; Winches, small electric; Oiler; Greaser; Rotary Drill Tender; Conveyor; Elevator Operator

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IRON0008-002 06/01/2008

BROWN, CALUMET, DOOR, FOND DU LAC, KEWAUNEE, MANITOWOC, MARINETTE, OCONTO, OUTAGAMI, SHAWANO, SHEBOYGAN, AND WINNEBAGO COUNTIES:

	Rates	Fringes

IRONWORKER.....$ 27.73 19.04

IRON0008-003 06/01/2008

KENOSHA, MILWAUKEE, OZAUKEE, RACINE, WALWORTH (N.E. 2/3), WASHINGTON, AND WAUKESHA COUNTIES

	Rates	Fringes
IRONWORKER	$ 30.06	19.04

IRON0383-001 06/01/2008

ADAMS, COLUMBIA, CRAWFORD, DANE, DODGE, FLORENCE, FOREST, GRANT, GREENE, (Excluding S.E. tip), GREEN LAKE, IOWA, JEFFERSON, JUNEAU, LA CROSSE, LAFAYETTE, LANGLADE, MARATHON, MARQUETTE, MENOMINEE, MONROE, PORTAGE, RICHLAND, ROCK (Northern area, vicinity of Edgerton and Milton), SAUK, VERNON, WAUPACA, WAUSHARA, AND WOOD COUNTIES

	Rates	Fringes
IRONWORKER	$ 30.30	15.73

IRON0512-008 05/01/2008

BARRON, BUFFALO, CHIPPEWA, CLARK, DUNN, EAU CLAIRE, JACKSON, PEPIN, PIERCE, POLK, RUSK, ST CROIX, TAYLOR, AND TREMPEALEAU COUNTIES

	Rates	Fringes
IRONWORKER	$ 32.80	19.42

IRON0512-021 05/01/2008

ASHLAND, BAYFIELD, BURNETT, DOUGLAS, IRON, LINCOLN, ONEIDA, PRICE, SAWYER, VILAS AND WASHBURN COUNTIES

	Rates	Fringes
IRONWORKER	$ 28.66	18.50

LABO0113-002 06/01/2008

MILWAUKEE AND WAUKESHA COUNTIES

	Rates	Fringes
Laborers:		
Group 1	$ 23.26	14.18
Group 2	$ 23.41	14.18
Group 3	$ 23.61	14.18
Group 4	$ 23.76	14.18
Group 5	$ 23.91	14.18
Group 6	$ 19.75	14.18

LABORERS CLASSIFICATIONS

GROUP 1: General Laborer; Tree Trimmer; Conduit Layer; Demolition and Wrecking Laborer; Guard Rail, Fence, and Bridge Builder; Landscaper; Multiplate Culvert Assembler; Stone Handler; Bituminous Worker (Shoveler, Loader, and

Utility Man); Batch Truck Dumper or Cement Handler; Bituminous Worker (Dumper, Ironer, Smoother, and Tamper); Concrete Handler

GROUP 2: Air Tool Operator; Joint Sawer and Filler (Pavement); Vibrator or Tamper Operator (Mechanical Hand Operated); Chain Saw Operator; Demolition Burning TOrch Laborer

GROUP 3: Bituminous Worker (Raker and Luteman); Formsetter (Curb, Sidewalk, and Pavement); Strike Off Man

GROUP 4: Line and Grade Specialist

GROUP 5: Blaster and Powderman

GROUP 6: Flagperson; traffic control person

LABO0113-003 06/01/2008

OZAUKEE AND WASHINGTON COUNTIES

	Rates	Fringes
Laborers:		
Group 1	$ 22.51	14.18
Group 2	$ 22.61	14.18
Group 3	$ 22.66	14.18
Group 4	$ 22.86	14.18
Group 5	$ 22.71	14.18
Group 6	$ 19.60	14.18

LABORERS CLASSIFICATIONS

GROUP 1: General Laborer; Tree Trimmer; Conduit Layer; Demolition and Wrecking Laborer; Guard Rail, Fence, and Bridge Builder; Landscaper; Multiplate Culvert Assembler; Stone Handler; Bituminous Worker (Shoveler, Loader, and Utility Man); Batch Truck Dumper or Cement Handler; Bituminous Worker (Dumper, Ironer, Smoother, and Tamper); Concrete Handler

GROUP 2: Air Tool Operator; Joint Sawer and Filler (Pavement); Vibrator or Tamper Operator (Mechanical Hand Operated);

GROUP 3: Bituminous Worker (Raker and Luteman); Formsetter (Curb, Sidewalk, and Pavement); Strike Off Man

GROUP 4: Line and Grade Specialist

GROUP 5: Blaster; powderman

GROUP 6: Flagperson and Traffic Control Person

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* LABO0113-011 06/01/2008

KENOSHA AND RACINE COUNTIES

	Rates	Fringes
LABORERS		
Group 1	$ 21.52	14.98
Group 2	$ 21.67	14.98

Group 3	$ 21.87	14.98
Group 4	$ 21.84	14.98
Group 5	$ 22.17	14.98
Group 6	$ 18.66	14.98

LABORERS CLASSIFICATIONS:

GROUP 1: General laborer; Tree Trimmer; Conduit Layer; Demolition and Wrecking Laborer; Guard Rail, Fence, and Bridge Builder; Landscaper; Multiplate Culvert Assembler; Stone Handler; Bituminous Worker (Shoveler, Loader, and Utility Man); Batch Truck Dumper or Cement Handler; Bituminous worker (Dumper, Ironer, Smoother, and Tamper); Concrete Handler

GROUP 2: Air Tool Operator; Joint Sawer and Filler (Pavement); Vibrator or Tamper Operator (Mechanical Hand Operated); Chain Saw Operator; Demolition Burning Torch Laborer

GROUP 3: Bituminous Worker (Raker and Luteman); Formsetter (Curb, Sidewalk, and Pavement); Strike Off Man

GROUP 4: Line and Grade Specialist

GROUP 5: Blaster and Powderman

GROUP 6: Flagman; traffic control person

LABO0140-002 06/01/2008

ADAMS, ASHLAND, BARRON, BAYFIELD, BROWN, BUFFALO, BURNETT, CALUMET, CHIPPEWA, CLARK, COLUMBIA, CRAWFORD, DODGE, DOOR, DOUGLAS, DUNN, EAU CLAIRE, FLORENCE, FOND DU LAC, FOREST, GRANT, GREEN, GREEN LAKE, IRON, JACKSON, JUNEAU, IOWA, JEFFERSON, KEWAUNEE, LA CROSSE, LAFAYETTE, LANGLADE, LINCOLN, MANITOWOC, MARATHON, MARINETTE, MARQUETTE, MENOMINEE, MONROE, OCONTO, ONEIDA, OUTAGAMIE, PEPIN, PIERCE, POLK, PORTAGE, PRICE, RICHLAND, ROCK, RUSK, SAUK, SAWYER, SHAWANO, SHEBOYGAN, ST. CROIX, TAYLOR, TREMPEALEAU, VERNON, VILLAS, WALWORTH, WASHBURN, WAUPACA, WAUSHARA, WINNEBAGO, AND WOOD COUNTIES

	Rates	Fringes
Laborers:		
Group 1	$ 23.87	11.75
Group 2	$ 23.97	11.75
Group 3	$ 24.02	11.75
Group 4	$ 24.22	11.75
Group 5	$ 24.07	11.75
Group 6	$ 20.50	11.75

LABORERS CLASSIFICATIONS

GROUP 1: General Laborer; Tree Trimmer; Conduit Layer; Demolition and Wrecking Laborer; Guard Rail, Fence, and Bridge Builder; Landscaper; Multiplate Culvert Assembler; Stone Handler; Bitminous Worker (Shoveler, Loader, and Utility Man); Batch Truck Dumper or Cement Handler; Bituminous Worker (Dumper, Ironer, Smoother and Tamper); Concrete Handler

GROUP 2: Air Tool Operator; Joint Sawer and Filler (Pavement); Vibrator or Tamper Operator (Mechanical Hand

Operated)

GROUP 3: Bituminous Worker (Raker and Luteman); Formsetter (Curb, Sidewalk and Pavement); Strike Off Man

GROUP 4: Line and Grade Secialist

GROUP 5: Blaster; powderman

GROUP 6: Flagperson; Traffic Control

LABO0464-003 06/01/2008

DANE COUNTY

	Rates	Fringes
Laborers:		
Group 1	$ 24.15	11.75
Group 2	$ 24.25	11.75
Group 3	$ 24.30	11.75
Group 4	$ 24.50	11.75
Group 5	$ 24.35	11.75
Group 6	$ 20.50	11.75

LABORERS CLASSIFICATIONS:

GROUP 1: General Laborer; Tree Trimmer; Conduit Layer; Demolition and Wrecking Laborer; Guard Rail, Fence, and Bridge Builder; Landscaper; Multiplate Culvert Assembler; Stone Handler; Bituminous Worker (Shoveler, Loader, and Utility Man); Batch Truck Dumper or Cement Handler; Bituminious Worker (Dumper, Ironer, Smoother, and Tamper); Concrete Handler

GROUP 2: Air Tool Operator; Joint Sawer and Filler (Pavement); Vibrator or Tamper Operator (Mechanical Hand Operated); Chain Saw Operator; Demolition Burning Torch Laborer

GROUP 3: Bituminous Worker (Raker and Luteman); Formsetter (Curb, Sidewalk, and Pavement); Strike Off Man

GROUP 4: Line and Grade Specialist

GROUP 5: Blaster; Powderman

GROUP 6: Flagperson and Traffic Control Person

PAIN0106-008 05/01/2008

ASHLAND, BAYFIELD, BURNETT, AND DOUGLAS COUNTIES

	Rates	Fringes
Painters:		
New:		
Brush, Roller	$ 27.41	12.52
Spray, Sandblast, Steel	$ 28.01	12.52
Repaint:		
Brush, Roller	$ 25.91	12.52
Spray, Sandblast, Steel	$ 26.51	12.52

PAIN0108-002 06/01/2008

RACINE COUNTY

	Rates	Fringes
Painters:		
Brush, Roller	$ 27.10	14.14
Spray & Sandblast	$ 28.10	14.14

PAIN0259-002 05/01/2008

BARRON, CHIPPEWA, DUNN, EAU CLAIRE, PEPIN, PIERCE, POLK, RUSK, SAWYER, ST. CROIX, AND WASHBURN COUNTIES

	Rates	Fringes
PAINTER	$ 24.11	12.15

PAIN0259-004 05/01/2008

BUFFALO, CRAWFORD, JACKSON, LA CROSSE, MONROE, TREMPEALEAU, AND VERNON COUNTIES

	Rates	Fringes
PAINTER	$ 20.43	8.40

PAIN0781-002 06/01/2008

JEFFERSON, MILWAUKEE, OZAUKEE, WASHINGTON, AND WAUKESHA COUNTIES

	Rates	Fringes
Painters:		
Bridge	$ 27.47	14.09
Brush	$ 27.12	14.09
Spray & Sandblast	$ 27.87	14.09

PAIN0802-002 06/01/2008

COLUMBIA, DANE, DODGE, GRANT, GREEN, IOWA, LAFAYETTE, RICHLAND, ROCK, AND SAUK COUNTIES

	Rates	Fringes
Painters:		
Brush	$ 25.00	12.15
Structural Steel, Spray, Bridges	$ 26.00	12.15

PAIN0802-003 06/01/2008

ADAMS, BROWN, CALUMET, CLARK, DOOR, FOND DU LAC, FOREST, GREEN LAKE, IRON, JUNEAU, KEWAUNEE, LANGLADE, LINCOLN, MANITOWOC, MARATHON, MARINETTE, MARQUETTE, MENOMINEE, OCONTO, ONEIDA, OUTAGAMIE, PORTAGE, PRICE, SHAWANO, SHEBOYGAN, TAYLOR, VILAS, WAUSHARA, WAUPACA, WINNEBAGO, AND WOOD COUNTIES

	Rates	Fringes
Painters:	$ 21.32	9.07

PAIN0934-001 06/01/2008

KENOSHA AND WALWORTH COUNTIES

	Rates	Fringes
Painters:		
Brush	$ 27.10	14.14
Spray	$ 28.10	14.14
Structural Steel	$ 27.15	14.14

PAIN1011-002 06/01/2008

FLORENCE COUNTY

	Rates	Fringes
Painters:	$ 22.60	7.90

PLAS0599-010 06/01/2007

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER		
Area 1	$ 28.27	12.73
Area 2 (BAC)	$ 28.15	12.80
Area 3	$ 26.10	13.65
Area 4	$ 26.82	12.93
Area 5	$ 26.97	12.78
Area 6	$ 24.08	15.67

AREA DESCRIPTIONS

AREA 1: BAYFIELD, DOUGLAS, PRICE, SAWYER, AND WASHBURN COUNTIES

AREA 2: ADAMS, ASHLAND, BARRON, BROWN, BURNETT, CALUMET, CHIPPEWA, CLARK, COLUMBIA, DODGE, DOOR, DUNN, FLORENCE, FOND DU LAC, FOREST, GREEN LAKE, IRON, JEFFERSON, KEWAUNEE, LANGLADE, LINCOLN, MANITOWOC, MARATHON, MARINETTE, MARQUETTE, MENOMINEE, OCONTO, ONEIDA, OUTAGAMIE, POLK, PORTAGE, RUSK, ST CROIX, SAUK, SHAWANO, SHEBOYGAN, TAYLOR, VILAS, WALWORTH, WAUPACA, WAUSHARA, WINNEBAGO, AND WOOD COUNTIES

AREA 3: BUFFALO, CRAWFORD, EAU CLAIRE, JACKSON, JUNEAU, LA CROSSE MONROE, PEPIN, PIERCE, RICHLAND, TREMPEALEAU, AND VERNON COUNTIES

AREA 4: MILWAUKEE, OZAUKEE, WASHINGTON, AND WAUKESHA COUNTIES

AREA 5: DANE, GRANT, GREEN, IOWA, LAFAYETTE, AND ROCK COUNTIES

AREA 6: KENOSHA AND RACINE COUNTIES

PLUM0011-003 05/01/2008

ASHLAND, BAYFIELD, BURNETT, DOUGLAS, IRON, SAWYER, AND WASHBURN COUNTIES

	Rates	Fringes
PLUMBER	$ 33.70	14.35

PLUM0075-002 06/01/2008

MILWAUKEE, OZAUKEE, WASHINGTON, AND WAUKESHA COUNTIES

	Rates	Fringes
PLUMBER	$ 35.18	13.71

PLUM0075-004 06/01/2008

DODGE (Watertown), GREEN, JEFFERSON, LAFAYETTE, AND ROCK COUNTIES

	Rates	Fringes
PLUMBER/PIPEFITTER	$ 35.43	13.71

PLUM0075-009 06/01/2008

COLUMBIA, DANE, IOWA, MARQUETTE, RICHLAND AND SAUK COUNTIES

	Rates	Fringes
PLUMBER	$ 34.78	12.76

PLUM0118-002 06/01/2008

KENOSHA, RACINE, AND WALWORTH COUNTIES

	Rates	Fringes
Plumber and Steamfitter	$ 34.31	14.84

PLUM0400-003 06/02/2008

ADAMS,BROWN, CALUMET, DODGE (except Watertown), DOOR, FOND DU LAC, GREEN LAKE,KEWAUNEE, MANITOWOC, MARINETTE (except Niagara), MENOMINEE, OCONTO, OUTAGAMIE, SHAWANO, SHEBOYGAN, WAUPACA, WAUSHARA, AND WINNEBAGO COUNTIES

	Rates	Fringes
PLUMBER/PIPEFITTER	$ 31.43	13.56

PLUM0434-002 11/30/2008

BARON, BUFFALO, CHIPPEWA, CLARK, CRAWFORD, DUNN, EAU CLAIRE, FLORENCE, FOREST, GRANT, JACKSON, JUNEAU, LA CROSSE, LANGLADE, LINCOLN, MARATHON, MONROE, ONEIDA, PEPIN, PIERCE, POLK, PORTAGE, PRICE, RUSK, ST. CROIX, TAYLOR, TREMPEALEAU, VERNON, VILAS, AND WOOD COUNTIES

	Rates	Fringes
PIPEFITTER	$ 32.24	13.63

PLUM0506-007 06/01/2003

MARINETTE COUNTY (Niagara only)

	Rates	Fringes
PLUMBER/PIPEFITTER		
(1) Jobs where plumbing		

bid is $50,000 or less.....$ 20.56 12.05
(2) All other work.....$ 25.71 12.05

TEAM0039-002 05/01/2008

	Rates	Fringes
TRUCK DRIVER		
1 & 2 Axle Trucks.....$	22.59	14.30
3 or more axles; Euclids or Dumptor, Articulated Truck, Mechanic.....$	22.35	13.24

SELF-PROPELLED HOPPER DREDGE:

Drag Tender	$ 8.78	$4.23+A

FOOTNOTE:
A. Paid Holidays: New years Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Paul Hall's Birthday (August 20), Veteran,s Day, Thanksgiving Day, and Christmas Day

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WELL DRILLER	$16.52	$3.70

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

In the listing above, the "SU" designation means that rates listed under the identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the

Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

American Recovery and Reinvestment Act (ARRA) "Federal Stimulus Package" Special Requirements

Rules and Regulations

Federal Register
Vol. 74, No. 77
Thursday, April 23, 2009

This section of the FEDERAL REGISTER contains regulatory documents having general applicability and legal effect, most of which are keyed to and codified in the Code of Federal Regulations, which is published under 50 titles pursuant to 44 U.S.C. 1510.

The Code of Federal Regulations is sold by the Superintendent of Documents. Prices of new books are listed in the first FEDERAL REGISTER issue of each week.

OFFICE OF MANAGEMENT AND BUDGET

2 CFR Part 176

Requirements for Implementing Sections 1512, 1605, and 1606 of the American Recovery and Reinvestment Act of 2009 for Financial Assistance Awards

AGENCY: Office of Federal Financial Management, Office of Management and Budget (OMB).

ACTION: Interim final guidance.

SUMMARY: The Office of Federal Financial Management (OFFM) is establishing Governmentwide guidance and standard award terms for agencies to include in financial assistance awards (namely, grants, cooperative agreements, and loans) as part of their implementation of sections 1512, and 1605, and 1606 of the American Recovery and Reinvestment Act of 2009 (Pub. L. 111–5). This guidance does not cover all award terms that may be needed on financial assistance awards funded directly or assisted by the Federal Government under the Recovery Act. The focus of this guidance is on implementing Recovery Act provisions that may require greater clarification in order to foster consistent application across the Federal Government. Under the interim final guidance, agencies would use the standard award terms in their financial assistance awards to require recipients and subrecipients (first-tier that are not individuals) to maintain current registrations in the Central Contractor Registration (CCR) database; to require recipients to report quarterly on project or activity status, subgrant and subcontract information; to notify recipients of the domestic sourcing ("Buy American") requirements that apply to certain iron, steel and manufactured goods; to notify recipients of the wage rate requirements that apply to certain projects; and to ensure proper accounting and reporting of Recovery Act expenditures in single audits.

DATES: This document is effective April 23, 2009. To be considered in preparation of the final guidance, comments on the interim final guidance must be received by no later than June 22, 2009.

ADDRESSES: Due to potential delays in OMB's receipt and processing of mail sent through the U.S. Postal Service, we encourage respondents to submit comments electronically to ensure timely receipt. We cannot guarantee that comments mailed will be received before the comment closing date.

Comments may be sent to via *http://www.regulations.gov*—a Federal E-Government Web site that allows the public to find, review, and submit comments on documents that agencies have published in the **Federal Register** and that are open for comment. Simply type "Recovery Act Guidance" (in quotes) in the Comment or Submission search box, click Go, and follow the instructions for submitting comments. Comments received by the date specified above will be included as part of the official record.

Electronic mail comments may also be submitted to: Marguerite Pridgen at *mpridgen@omb.eop.gov*. Please include "Recovery Act Guidance" in the subject line and the full body of your comments in the text of the electronic message and not as an attachment. Please include your name, title, organization, postal address, telephone number, and e-mail address in the text of the message. Comments may also be submitted via facsimile to (202) 395–3952.

Comments may be mailed to Marguerite Pridgen, Office of Federal Financial Management, Office of Management and Budget, Room 6025, New Executive Office Building, Washington, DC 20503.

All responses will be summarized and included in the request for OMB approval.

FOR FURTHER INFORMATION CONTACT: Marguerite Pridgen, Office of Federal Financial Management, Office of Management and Budget, telephone (202) 395–7844 (direct) or (202) 395–3993 (main office) and e-mail: *Marguerite_E._Pridgen@omb.eop.gov*.

SUPPLEMENTARY INFORMATION:

I. Background

A. Section 1512(c) of the American Recovery and Reinvestment Act of 2009 (Pub. L. 111–5, hereafter referred to as "the Recovery Act" or "the Act") requires, as a condition of receipt of funds, quarterly reporting on the use of funds. The data elements proposed for reporting the information described in section 1512(c) were published in the **Federal Register** on April 1, 2009 [74 FR 14824]. An entity that receives assistance funding under the Recovery Act must report information including, but not limited to,

i. The total amount of recovery funds received from that agency;

ii. The amount of recovery funds received that were expended or obligated to projects or activities; and

iii. A detailed list of all projects or activities for which recovery funds were expended or obligated, including—

1. The name of the project or activity;

2. A description of the project or activity;

3. An evaluation of the completion status of the project or activity;

4. An estimate of the number of jobs created and the number of jobs retained by the project or activity; and

5. For infrastructure investments made by State and local governments, the purpose, total cost, and rationale of the agency for funding the infrastructure investment with funds made available under this Act, and name of the person to contact at the agency if there are concerns with the infrastructure investment.

iv. Detailed information on any subcontracts or subgrants awarded by the recipient to include the data elements required to comply with the Federal Funding Accountability and Transparency Act of 2006, as amended (Pub. L. 109–282, hereafter referred to as "the Transparency Act"), allowing aggregate reporting on awards below $25,000 or to individuals, as prescribed by the Director of the Office of Management and Budget. The Transparency Act identifies specific data elements that the Web site (USAspending.gov) must include for each Federal award and authorizes OMB to specify additional elements for other relevant information. A 2008 amendment to the Transparency Act called the "Government Funding Transparency Act of 2008" (Pub. L. 110–252) added a requirement to collect

compensation information on certain chief executive officers (CEOs) of the recipient and subrecipient entity. An entity that receives assistance funding under the Recovery Act must report information required under the Transparency Act including, but not limited to,

1. The name of the entity receiving the award;
2. The amount of the award;
3. The transaction type;
4. The funding agency;
5. The Catalog of Federal Domestic Assistance number;
6. The program source;
7. The location of the entity receiving the award, including four data elements for the city, State, Congressional district, and country;
8. The location of the primary place of performance under the award, including four data elements for the city, State, Congressional district, and country;
9. A unique identifier of the entity receiving the award;
10. A unique identifier of the parent entity of the recipient, should the recipient be owned by another entity; and
11. The names and total compensation of the five most highly compensated officers of the company if it received (1) 80% or more of its annual gross revenues in Federal awards; and (2) $25M or more in annual gross revenue from Federal awards.

B. Section 1512(h) of the Recovery Act requires recipients of Recovery Act funds, including those receiving funds directly from the Federal Government, to register in the Central Contractor Registration (CCR) database at *http://www.ccr.gov*. Because recipients must report information on their first-tier contracts and awards, 2 CFR part 176 would establish a requirement for subrecipient registration in the CCR as a way to help ensure consistent reporting of data about each entity and thereby make the data more useful to the public. Without the requirement, multiple recipients doing business with the same entity may use different variations of the entity's name, address, or parent organization when they each report on their awards to the entity. It should be noted that in order to register in CCR, a valid Data Universal Numbering System (DUNS) Number is required.

C. Section 1605 of the Recovery Act requires that projects, funded by the Recovery Act, for the construction, alteration, maintenance, or repair of a public building or public work use American iron, steel, and manufactured goods in the project unless one of the specified exemptions applies. The Act provides that this requirement be applied in a manner consistent with U.S. obligations under international agreements. Definitions of "manufactured good," "public building and public work," and other terms as they pertain to the Buy American guidance in 2 CFR part 176 are found in § 176.140 and § 176.160.

D. Section 1606 of the Recovery Act requires the payment of Davis-Bacon Act (40 U.S.C. 31) wage rates to "laborers and mechanics employed by contractors and subcontractors on projects funded directly by or assisted in whole or in part by and through the Federal Government" pursuant to the Recovery Act.

E. To maximize the transparency and accountability of funds authorized under the Recovery Act as required by Congress and in accordance with 2 CFR 215.21, "Uniform Administrative Requirements for Grants and Agreements With Institutions of Higher Education, Hospitals, and other Non-Profit Organizations" and OMB Circular A–102 Common Rules provisions, recipients agree to maintain records that identify adequately the source and application of Recovery Act funds. Guidance and an award term are provided in part 176 to help ensure that recipients understand their responsibilities with respect to tracking, accounting and reporting transactions during the award and in preparing audit documentation and reports in accordance with OMB Circular A–133, if applicable.

II. Next Steps

We will consider all comments received on the interim final version of the OMB guidance as we develop the final guidance. Federal agencies that award grants, cooperative agreements, and other financial assistance awards will immediately implement this interim final guidance through the appropriate award terms. The award terms on awards made while this interim final version of this guidance is in effect do not need to be modified to reflect any modified award terms in the final guidance unless specifically required in the final guidance.

List of Subjects in 2 CFR Part 176

Assistance awards, Authorized agency action official, Award officials, Buy American, Classified, Davis-Bacon Act, Grants, Cooperative agreements, Loans, Recovery Act, Wage rate.

Danny Werfel,

Deputy Controller.

■ For the reasons set forth above, the Office of Management and Budget amends 2 CFR chapter I by adding part 176 to read as follows:

PART 176—AWARD TERMS FOR ASSISTANCE AGREEMENTS THAT INCLUDE FUNDS UNDER THE AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009, PUBLIC LAW 111–5

Sec.

176.10 Purpose of this part.
176.20 Agency responsibilities (general).
176.30 Definitions.

Subpart A—Reporting and Registration Requirements under Section 1512 of the American Recovery and Reinvestment Act of 2009

176.40 Procedure.
176.50 Award term—Reporting and registration requirements under section 1512 of the Recovery Act.

Subpart B—Buy American Requirement Under Section 1605 of the American Recovery and Reinvestment Act of 2009

176.60 Statutory requirement.
176.70 Policy.
176.80 Exceptions.
176.90 Non-application to acquisitions covered under international agreements.
176.100 Timely determination concerning the inapplicability of section 1605 of the Recovery Act.
176.110 Evaluating proposals of foreign iron, steel, and/or manufactured goods.
176.120 Determinations on late requests.
176.130 Noncompliance.
176.140 Award term—Required Use of American Iron, Steel, and Manufactured Goods—Section 1605 of the American Recovery and Reinvestment Act of 2009.
176.150 Notice of Required Use of American Iron, Steel, and Manufactured Goods—Section 1605 of the American Recovery and Reinvestment Act of 2009.
176.160 Award term—Required Use of American Iron, Steel, and Manufactured Goods (covered under International Agreements)—Section 1605 of the American Recovery and Reinvestment Act of 2009.
176.170 Notice of Required Use of American Iron, Steel, and Manufactured Goods (covered under International Agreements)—Section 1605 of the American Recovery and Reinvestment Act of 2009.

Appendix to Subpart B of Part 176—U.S. States, Other Sub-Federal Entities, and Other Entities Subject to U.S. Obligations Under International Agreements

Subpart C—Wage Rate Requirements Under Section 1606 of the American Recovery and Reinvestment Act of 2009

176.180 Procedure.

176.190 Award term—Wage Rate Requirements under Section 1606 of the American Recovery and Reinvestment Act of 2009.

Subpart D—Single Audit Information for Recipients of Recovery Act Funds

176.200 Procedure.
176.210 Award term—Recovery Act Transactions listed in Schedule of Expenditures of Federal Awards and Recipient Responsibilities for Informing Subrecipients.

Authority: American Recovery and Reinvestment Act of 2009, Public Law 111–5; Federal Funding Accountability and Transparency Act of 2006, (Pub. L. 109–282), as amended.

§ 176.10 Purpose of this part.

This part establishes Federal Governmentwide award terms for financial assistance awards, namely, grants, cooperative agreements, and loans, to implement the cross-cutting requirements of the American Recovery and Reinvestment Act of 2009, Public Law 111–5 (Recovery Act). These requirements are cross-cutting in that they apply to more than one agency's awards.

§ 176.20 Agency responsibilities (general).

(a) In any assistance award funded in whole or in part by the Recovery Act, the award official shall indicate that the award is being made under the Recovery Act, and indicate what projects and/or activities are being funded under the Recovery Act. This requirement applies whenever Recovery Act funds are used, regardless of the assistance type.

(b) To maximize transparency of Recovery Act funds required for reporting by the assistance recipient, the award official shall consider structuring assistance awards to allow for separately tracking Recovery Act funds.

(c) Award officials shall ensure that recipients comply with the Recovery Act requirements of Subpart A. If the recipient fails to comply with the reporting requirements or other award terms, the award official or other authorized agency action official shall take the appropriate enforcement or termination action in accordance with 2 CFR 215.62 or the agency's implementation of the OMB Circular A–102 grants management common rule. OMB Circular A–102 is available at *http://www.whitehouse.gov/omb/circulars/a102/a102.html.*

(d) The award official shall make the recipient's failure to comply with the reporting requirements a part of the recipient's performance record.

§ 176.30 Definitions.

As used in this part—

Award means any grant, cooperative agreement or loan made with Recovery Act funds. Award official means a person with the authority to enter into, administer, and/or terminate financial assistance awards and make related determinations and findings.

Classified or *"classified information"* means any knowledge that can be communicated or any documentary material, regardless of its physical form or characteristics, that—

(1)(i) Is owned by, is produced by or for, or is under the control of the United States Government; or

(ii) Has been classified by the Department of Energy as privately generated restricted data following the procedures in 10 CFR 1045.21; and

(2) Must be protected against unauthorized disclosure according to Executive Order 12958, Classified National Security Information, April 17, 1995, or classified in accordance with the Atomic Energy Act of 1954.

Recipient means any entity other than an individual that receives Recovery Act funds in the form of a grant, cooperative agreement or loan directly from the Federal Government.

Recovery funds or Recovery Act funds are funds made available through the appropriations of the American Recovery and Reinvestment Act of 2009, Public Law 111–5.

Subaward means—

(1) A legal instrument to provide support for the performance of any portion of the substantive project or program for which the recipient received this award and that the recipient awards to an eligible subrecipient;

(2) The term does not include the recipient's procurement of property and services needed to carry out the project or program (for further explanation, see §____.210 of the attachment to OMB Circular A–133, "Audits of States, Local Governments, and Non-Profit Organizations"). OMB Circular A–133 is available at *http://www.whitehouse.gov/omb/circulars/a133/a133.html.*

(3) A subaward may be provided through any legal agreement, including an agreement that the recipient or a subrecipient considers a contract.

Subcontract means a legal instrument used by a recipient for procurement of property and services needed to carry out the project or program.

Subrecipient or *Subawardee* means a non-Federal entity that expends Federal awards received from a pass-through entity to carry out a Federal program, but does not include an individual that is a beneficiary of such a program. A subrecipient may also be a recipient of other Federal awards directly from a Federal awarding agency. Guidance on distinguishing between a subrecipient and a vendor is provided in §____.210 of OMB Circular A–133.

Subpart A—Reporting and Registration Requirements Under Section 1512 of the American Recovery and Reinvestment Act of 2009

§ 176.40 Procedure.

The award official shall insert the standard award term in this Subpart in all awards funded in whole or in part with Recovery Act funds, except for those that are classified, awarded to individuals, or awarded under mandatory and entitlement programs, except as specifically required by OMB, or expressly exempted from the reporting requirement in the Recovery Act.

§ 176.50 Award term—Reporting and registration requirements under section 1512 of the Recovery Act.

Agencies are responsible for ensuring that their recipients report information required under the Recovery Act in a timely manner. The following award term shall be used by agencies to implement the recipient reporting and registration requirements in section 1512:

(a) This award requires the recipient to complete projects or activities which are funded under the American Recovery and Reinvestment Act of 2009 (Recovery Act) and to report on use of Recovery Act funds provided through this award. Information from these reports will be made available to the public.

(b) The reports are due no later than ten calendar days after each calendar quarter in which the recipient receives the assistance award funded in whole or in part by the Recovery Act.

(c) Recipients and their first-tier recipients must maintain current registrations in the Central Contractor Registration (*http://www.ccr.gov*) at all times during which they have active federal awards funded with Recovery Act funds. A Dun and Bradstreet Data Universal Numbering System (DUNS) Number (*http://www.dnb.com*) is one of the requirements for registration in the Central Contractor Registration.

(d) The recipient shall report the information described in section 1512(c) of the Recovery Act using the reporting instructions and data elements that will be provided online at *http://www.FederalReporting.gov* and ensure that any information that is pre-filled is corrected or updated as needed.

Subpart B—Buy American Requirement Under Section 1605 of the American Recovery and Reinvestment Act of 2009

§ 176.60 Statutory requirement.

Section 1605 of the Recovery Act prohibits use of recovery funds for a project for the construction, alteration, maintenance, or repair of a public building or public work unless all of the iron, steel, and manufactured goods used in the project are produced in the United States. The law requires that this prohibition be applied in a manner consistent with U.S. obligations under international agreements, and it provides for waiver under three circumstances:

(a) Iron, steel, or relevant manufactured goods are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality;

(b) Inclusion of iron, steel, or manufactured goods produced in the United States will increase the cost of the overall project by more than 25 percent; or

(c) Applying the domestic preference would be inconsistent with the public interest.

§ 176.70 Policy.

Except as provided in § 176.80 or § 176.90—

(a) None of the funds appropriated or otherwise made available by the Recovery Act may be used for a project for the construction, alteration, maintenance, or repair of a public building or public work (see definitions at §§ 176.140 and 176.160) unless—

(1) The public building or public work is located in the United States; and

(2) All of the iron, steel, and manufactured goods used in the project are produced or manufactured in the United States.

(i) Production in the United States of the iron or steel used in the project requires that all manufacturing processes must take place in the United States, except metallurgical processes involving refinement of steel additives. These requirements do not apply to iron or steel used as components or subcomponents of manufactured goods used in the project.

(ii) There is no requirement with regard to the origin of components or subcomponents in manufactured goods used in the project, as long as the manufacturing occurs in the United States.

(b) Paragraph (a) of this section shall not apply where the Recovery Act requires the application of alternative Buy American requirements for iron, steel, and manufactured goods.

§ 176.80 Exceptions.

(a) When one of the following exceptions applies in a case or category of cases, the award official may allow the recipient to use foreign iron, steel and/or manufactured goods in the project without regard to the restrictions of section 1605 of the Recovery Act:

(1) *Nonavailability.* The head of the Federal department or agency may determine that the iron, steel or relevant manufactured good is not produced or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality. The determinations of nonavailability of the articles listed at 48 CFR 25.104(a) and the procedures at 48 CFR 25.103(b)(1) also apply if any of those articles are manufactured goods needed in the project.

(2) *Unreasonable cost.* The head of the Federal department or agency may determine that the cost of domestic iron, steel, or relevant manufactured goods will increase the cost of the overall project by more than 25 percent in accordance with § 176.110.

(3) *Inconsistent with public interest.* The head of the Federal department or agency may determine that application of the restrictions of section 1605 of the Recovery Act would be inconsistent with the public interest.

(b) When a determination is made for any of the reasons stated in this section that certain foreign iron, steel, and/or manufactured goods may be used—

(1) The award official shall list the excepted materials in the award; and

(2) The head of the Federal department or agency shall publish a notice in the **Federal Register** within two weeks after the determination is made, unless the item has already been determined to be domestically nonavailable. A list of items that are not domestically available is at 48 CFR 25.104(a). The **Federal Register** notice or information from the notice may be posted by OMB to Recovery.gov. The notice shall include—

(i) The title "Buy American Exception under the American Recovery and Reinvestment Act of 2009";

(ii) The dollar value and brief description of the project; and

(iii) A detailed written justification as to why the restriction is being waived.

§ 176.90 Non-application to acquisitions covered under international agreements.

Acquisitions covered by international agreements. Section 1605(d) of the Recovery Act provides that the Buy American requirement in section 1605 shall be applied in a manner consistent with U.S. obligations under international agreements.

(a) The Buy American requirement set out in § 176.70 shall not be applied where the iron, steel, or manufactured goods used in the project are from a Party to an international agreement, listed in paragraph (b)(2) of this section, and the recipient is required under an international agreement, described in the appendix to this subpart, to treat the goods and services of that Party the same as domestic goods and services. This obligation shall only apply to projects with an estimated value of $7,443,000 or more and projects that are not specifically excluded from the application of those agreements.

(b) The international agreements that obligate recipients that are covered under an international agreement to treat the goods and services of a Party the same as domestic goods and services and the respective Parties to the agreements are:

(1) The World Trade Organization Government Procurement Agreement (Aruba, Austria, Belgium, Bulgaria, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea (Republic of), Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, and United Kingdom);

(2) The following Free Trade Agreements:

(i) Dominican Republic-Central America-United States Free Trade Agreement (Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua);

(ii) North American Free Trade Agreement (NAFTA) (Canada and Mexico);

(iii) United States-Australia Free Trade Agreement;

(iv) United States-Bahrain Free Trade Agreement;

(v) United States-Chile Free Trade Agreement;

(vi) United States-Israel Free Trade Agreement;

(vii) United States-Morocco Free Trade Agreement;

(viii) United States-Oman Free Trade Agreement;

(ix) United States-Peru Trade Promotion Agreement; and

(x) United States-Singapore Free Trade Agreement.

(3) United States-European Communities Exchange of Letters (May 15, 1995): Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark,

Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, and United Kingdom.

§ 176.100 Timely determination concerning the inapplicability of section 1605 of the Recovery Act.

(a) The head of the Federal department or agency involved may make a determination regarding inapplicability of section 1605 to a particular case or to a category of cases.

(b) Before Recovery Act funds are awarded by the Federal agency or obligated by the recipient for a project for the construction, alteration, maintenance, or repair of a public building or public work, an applicant or recipient may request from the award official a determination concerning the inapplicability of section 1605 of the Recovery Act for specifically identified items.

(c) The time for submitting the request and the information and supporting data that must be included in the request are to be specified in the agency's and recipient's request for applications and/or proposals, and as appropriate, in other written communications. The content of those communications should be consistent with the notice in § 176.150 or § 176.170, whichever applies.

(d) The award official must evaluate all requests based on the information provided and may supplement this information with other readily available information.

(e) In making a determination based on the increased cost to the project of using domestic iron, steel, and/or manufactured goods, the award official must compare the total estimated cost of the project using foreign iron, steel and/or relevant manufactured goods to the estimated cost if all domestic iron, steel, and/or relevant manufactured goods were used. If use of domestic iron, steel, and/or relevant manufactured goods would increase the cost of the overall project by more than 25 percent, then the award official shall determine that the cost of the domestic iron, steel, and/or relevant manufactured goods is unreasonable.

§ 176.110 Evaluating proposals of foreign iron, steel, and/or manufactured goods.

(a) If the award official receives a request for an exception based on the cost of certain domestic iron, steel, and/or manufactured goods being unreasonable, in accordance with § 176.80, then the award official shall apply evaluation factors to the proposal to use such foreign iron, steel, and/or manufactured goods as follows:

(1) Use an evaluation factor of 25 percent, applied to the total estimated cost of the project, if the foreign iron, steel, and/or manufactured goods are to be used in the project based on an exception for unreasonable cost requested by the applicant.

(2) Total evaluated cost = project cost estimate + (.25 × project cost estimate, if paragraph (a)(1) of this section applies).

(b) Applicants or recipients also may submit alternate proposals based on use of equivalent domestic iron, steel, and/or manufactured goods to avoid possible denial of Recovery Act funding for the proposal if the Federal Government determines that an exception permitting use of the foreign item(s) does not apply.

(c) If the award official makes an award to an applicant that proposed foreign iron, steel, and/or manufactured goods not listed in the applicable notice in the request for applications or proposals, then the award official must add the excepted materials to the list in the award term.

§ 176.120 Determinations on late requests.

(a) If a recipient requests a determination regarding the inapplicability of section 1605 of the Recovery Act after obligating Recovery Act funds for a project for construction, alteration, maintenance, or repair (late request), the recipient must explain why it could not request the determination before making the obligation or why the need for such determination otherwise was not reasonably foreseeable. If the award official concludes that the recipient should have made the request before making the obligation, the award official may deny the request.

(b) The award official must base evaluation of any late request for a determination regarding the inapplicability of section 1605 of the Recovery Act on information required by § 176.150(c) and (d) or § 176.170(c) and (d) and/or other readily available information.

(c) If a determination, under § 176.80 is made after Recovery Act funds were obligated for a project for construction, alteration, maintenance, or repair that an exception to section 1605 of the Recovery Act applies, the award official must amend the award to allow use of the foreign iron, steel, and/or relevant manufactured goods. When the basis of the exception is nonavailability or public interest, the amended award shall reflect adjustment of the award amount, redistribution of budgeted funds, and/or other appropriate actions taken to cover costs associated with acquiring or using the foreign iron, steel, and/or manufactured goods. When the basis for the exception is the unreasonable cost of domestic iron, steel, and/or manufactured goods the award official shall adjust the award amount or the budget, as appropriate, by at least the differential established in § 176.110(a).

§ 176.130 Noncompliance.

The award official must—

(a) Review allegations of violations of section 1605 of the Recovery Act;

(b) Unless fraud is suspected, notify the recipient of the apparent unauthorized use of foreign iron, steel, and/or manufactured goods and request a reply, to include proposed corrective action; and

(c) If the review reveals that a recipient or subrecipient has used foreign iron, steel, and/or manufactured goods without authorization, take appropriate action, including one or more of the following:

(1) Process a determination concerning the inapplicability of section 1605 of the Recovery Act in accordance with § 176.120.

(2) Consider requiring the removal and replacement of the unauthorized foreign iron, steel, and/or manufactured goods.

(3) If removal and replacement of foreign iron, steel, and/or manufactured goods used in a public building or a public work would be impracticable, cause undue delay, or otherwise be detrimental to the interests of the Federal Government, the award official may determine in writing that the foreign iron, steel, and/or manufactured goods need not be removed and replaced. A determination to retain foreign iron, steel, and/or manufactured goods does not constitute a determination that an exception to section 1605 of the Recovery Act applies, and this should be stated in the determination. Further, a determination to retain foreign iron, steel, and/or manufactured goods does not affect the Federal Government's right to reduce the amount of the award by the cost of the steel, iron, or manufactured goods that are used in the project or to take enforcement or termination action in accordance with the agency's grants management regulations.

(4) If the noncompliance is sufficiently serious, consider exercising appropriate remedies, such as withholding cash payments pending correction of the deficiency, suspending or terminating the award, and withholding further awards for the project. Also consider preparing and

forwarding a report to the agency suspending or debarring official in accordance with the agency's debarment rule implementing 2 CFR part 180. If the noncompliance appears to be fraudulent, refer the matter to other appropriate agency officials, such as the officer responsible for criminal investigation.

§ 176.140 Award term—Required Use of American Iron, Steel, and Manufactured Goods—Section 1605 of the American Recovery and Reinvestment Act of 2009.

When awarding Recovery Act funds for construction, alteration, maintenance, or repair of a public building or public work that does not involve iron, steel, and/or manufactured goods covered under international agreements, the agency shall use the award term described in the following paragraphs:

(a) *Definitions.* As used in this award term and condition—

(1) *Manufactured good* means a good brought to the construction site for incorporation into the building or work that has been—

(i) Processed into a specific form and shape; or

(ii) Combined with other raw material to create a material that has different properties than the properties of the individual raw materials.

(2) *Public building and public work* means a public building of, and a public work of, a governmental entity (the United States; the District of Columbia; commonwealths, territories, and minor outlying islands of the United States; State and local governments; and multi-State, regional, or interstate entities which have governmental functions). These buildings and works may include, without limitation, bridges, dams, plants, highways, parkways, streets, subways, tunnels, sewers, mains, power lines, pumping stations, heavy generators, railways, airports, terminals, docks, piers, wharves, ways, lighthouses, buoys, jetties, breakwaters, levees, and canals, and the construction, alteration, maintenance, or repair of such buildings and works.

(3) *Steel* means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements.

(b) *Domestic preference.* (1) This award term and condition implements Section 1605 of the American Recovery and Reinvestment Act of 2009 (Recovery Act) (Pub. L. 111–5), by requiring that all iron, steel, and manufactured goods used in the project are produced in the United States except as provided in paragraph (b)(3) and (b)(4) of this section and condition.

(2) This requirement does not apply to the material listed by the Federal Government as follows:

[*Award official to list applicable excepted materials or indicate "none"*]

(3) The award official may add other iron, steel, and/or manufactured goods to the list in paragraph (b)(2) of this section and condition if the Federal Government determines that—

(i) The cost of the domestic iron, steel, and/or manufactured goods would be unreasonable. The cost of domestic iron, steel, or manufactured goods used in the project is unreasonable when the cumulative cost of such material will increase the cost of the overall project by more than 25 percent;

(ii) The iron, steel, and/or manufactured good is not produced, or manufactured in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or

(iii) The application of the restriction of section 1605 of the Recovery Act would be inconsistent with the public interest.

(c) *Request for determination of inapplicability of Section 1605 of the Recovery Act.* (1)(i) Any recipient request to use foreign iron, steel, and/or manufactured goods in accordance with paragraph (b)(3) of this section shall include adequate information for Federal Government evaluation of the request, including—

(A) A description of the foreign and domestic iron, steel, and/or manufactured goods;

(B) Unit of measure;

(C) Quantity;

(D) Cost;

(E) Time of delivery or availability;

(F) Location of the project;

(G) Name and address of the proposed supplier; and

(H) A detailed justification of the reason for use of foreign iron, steel, and/or manufactured goods cited in accordance with paragraph (b)(3) of this section.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed cost comparison table in the format in paragraph (d) of this section.

(iii) The cost of iron, steel, and/or manufactured goods material shall include all delivery costs to the construction site and any applicable duty.

(iv) Any recipient request for a determination submitted after Recovery Act funds have been obligated for a project for construction, alteration, maintenance, or repair shall explain why the recipient could not reasonably foresee the need for such determination and could not have requested the determination before the funds were obligated. If the recipient does not submit a satisfactory explanation, the award official need not make a determination.

(2) If the Federal Government determines after funds have been obligated for a project for construction, alteration, maintenance, or repair that an exception to section 1605 of the Recovery Act applies, the award official will amend the award to allow use of the foreign iron, steel, and/or relevant manufactured goods. When the basis for the exception is nonavailability or public interest, the amended award shall reflect adjustment of the award amount, redistribution of budgeted funds, and/or other actions taken to cover costs associated with acquiring or using the foreign iron, steel, and/or relevant manufactured goods. When the basis for the exception is the unreasonable cost of the domestic iron, steel, or manufactured goods, the award official shall adjust the award amount or redistribute budgeted funds by at least the differential established in 2 CFR 176.110(a).

(3) Unless the Federal Government determines that an exception to section 1605 of the Recovery Act applies, use of foreign iron, steel, and/or manufactured goods is noncompliant with section 1605 of the American Recovery and Reinvestment Act.

(d) *Data.* To permit evaluation of requests under paragraph (b) of this section based on unreasonable cost, the Recipient shall include the following information and any applicable supporting data based on the survey of suppliers:

FOREIGN AND DOMESTIC ITEMS COST COMPARISON

Description	Unit of measure	Quantity	Cost (dollars)*
Item 1:			
Foreign steel, iron, or manufactured good			
Domestic steel, iron, or manufactured good			
Item 2:			
Foreign steel, iron, or manufactured good			
Domestic steel, iron, or manufactured good			

[List name, address, telephone number, email address, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.]
[Include other applicable supporting information.]
*[*Include all delivery costs to the construction site.]*

§ 176.150 Notice of Required Use of American Iron, Steel, and Manufactured Goods—Section 1605 of the American Recovery and Reinvestment Act of 2009.

When requesting applications or proposals for Recovery Act programs or activities that may involve construction, alteration, maintenance, or repair of a public building or public work, and do not involve iron, steel, and/or manufactured goods covered under international agreements, the agency shall use the notice described in the following paragraphs in their solicitations:

(a) *Definitions.* Manufactured good, public building and public work, and steel, as used in this notice, are defined in the 2 CFR 176.140.

(b) *Requests for determinations of inapplicability.* A prospective applicant requesting a determination regarding the inapplicability of section 1605 of the American Recovery and Reinvestment Act of 2009 (Pub. L. 111–5) (Recovery Act) should submit the request to the award official in time to allow a determination before submission of applications or proposals. The prospective applicant shall include the information and applicable supporting data required by paragraphs at 2 CFR 176.140(c) and (d) in the request. If an applicant has not requested a determination regarding the inapplicability of 1605 of the Recovery Act before submitting its application or proposal, or has not received a response to a previous request, the applicant shall include the information and supporting data in the application or proposal.

(c) *Evaluation of project proposals.* If the Federal Government determines that an exception based on unreasonable cost of domestic iron, steel, and/or manufactured goods applies, the Federal Government will evaluate a project requesting exception to the requirements of section 1605 of the Recovery Act by adding to the estimated total cost of the project 25 percent of the project cost, if foreign iron, steel, or manufactured goods are used in the project based on unreasonable cost of comparable manufactured domestic iron, steel, and/or manufactured goods.

(d) *Alternate project proposals.* (1) When a project proposal includes foreign iron, steel, and/or manufactured goods not listed by the Federal Government at 2 CFR 176.140(b)(2), the applicant also may submit an alternate proposal based on use of equivalent domestic iron, steel, and/or manufactured goods.

(2) If an alternate proposal is submitted, the applicant shall submit a separate cost comparison table prepared in accordance with 2 CFR 176.140(c) and (d) for the proposal that is based on the use of any foreign iron, steel, and/or manufactured goods for which the Federal Government has not yet determined an exception applies.

(3) If the Federal Government determines that a particular exception requested in accordance with 2 CFR 176.140(b) does not apply, the Federal Government will evaluate only those proposals based on use of the equivalent domestic iron, steel, and/or manufactured goods, and the applicant shall be required to furnish such domestic items.

§ 176.160 Award term—Required Use of American Iron, Steel, and Manufactured Goods (covered under International Agreements)—Section 1605 of the American Recovery and Reinvestment Act of 2009.

When awarding Recovery Act funds for construction, alteration, maintenance, or repair of a public building or public work that involves iron, steel, and/or manufactured goods materials covered under international agreements, the agency shall use the award term described in the following paragraphs:

(a) *Definitions.* As used in this award term and condition—

Designated country—(1) A World Trade Organization Government Procurement Agreement country (Aruba, Austria, Belgium, Bulgaria, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea (Republic of), Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, and United Kingdom;

(2) A Free Trade Agreement (FTA) country (Australia, Bahrain, Canada, Chile, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Israel, Mexico, Morocco, Nicaragua, Oman, Peru, or Singapore); or

(3) A United States-European Communities Exchange of Letters (May 15, 1995) country: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, and United Kingdom.

Designated country iron, steel, and/or manufactured goods—(1) Is wholly the growth, product, or manufacture of a designated country; or

(2) In the case of a manufactured good that consist in whole or in part of materials from another country, has been substantially transformed in a designated country into a new and different manufactured good distinct from the materials from which it was transformed.

Domestic iron, steel, and/or manufactured good—(1) Is wholly the growth, product, or manufacture of the United States; or

(2) In the case of a manufactured good that consists in whole or in part of materials from another country, has been substantially transformed in the United States into a new and different manufactured good distinct from the materials from which it was transformed. There is no requirement with regard to the origin of components or subcomponents in manufactured goods or products, as long as the manufacture of the goods occurs in the United States.

Foreign iron, steel, and/or manufactured good means iron, steel

and/or manufactured good that is not domestic or designated country iron, steel, and/or manufactured good.

Manufactured good means a good brought to the construction site for incorporation into the building or work that has been—

(1) Processed into a specific form and shape; or

(2) Combined with other raw material to create a material that has different properties than the properties of the individual raw materials.

Public building and *public work* means a public building of, and a public work of, a governmental entity (the United States; the District of Columbia; commonwealths, territories, and minor outlying islands of the United States; State and local governments; and multi-State, regional, or interstate entities which have governmental functions). These buildings and works may include, without limitation, bridges, dams, plants, highways, parkways, streets, subways, tunnels, sewers, mains, power lines, pumping stations, heavy generators, railways, airports, terminals, docks, piers, wharves, ways, lighthouses, buoys, jetties, breakwaters, levees, and canals, and the construction, alteration, maintenance, or repair of such buildings and works.

Steel means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements.

(b) *Iron, steel, and manufactured goods.* (1) The award term and condition described in this section implements—

(i) Section 1605(a) of the American Recovery and Reinvestment Act of 2009 (Pub. L. 111–5) (Recovery Act), by requiring that all iron, steel, and manufactured goods used in the project are produced in the United States; and

(ii) Section 1605(d), which requires application of the Buy American requirement in a manner consistent with U.S. obligations under international agreements. The restrictions of section 1605 of the Recovery Act do not apply to designated country iron, steel, and/or manufactured goods. The Buy American requirement in section 1605 shall not be applied where the iron, steel or manufactured goods used in the project are from a Party to an international agreement that obligates the recipient to treat the goods and services of that Party the same as domestic goods and services. This obligation shall only apply to projects with an estimated value of $7,443,000 or more.

(2) The recipient shall use only domestic or designated country iron, steel, and manufactured goods in performing the work funded in whole or part with this award, except as provided in paragraphs (b)(3) and (b)(4) of this section.

(3) The requirement in paragraph (b)(2) of this section does not apply to the iron, steel, and manufactured goods listed by the Federal Government as follows:

[*Award official to list applicable excepted materials or indicate "none"*]

(4) The award official may add other iron, steel, and manufactured goods to the list in paragraph (b)(3) of this section if the Federal Government determines that—

(i) The cost of domestic iron, steel, and/or manufactured goods would be unreasonable. The cost of domestic iron, steel, and/or manufactured goods used in the project is unreasonable when the cumulative cost of such material will increase the overall cost of the project by more than 25 percent;

(ii) The iron, steel, and/or manufactured good is not produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality; or

(iii) The application of the restriction of section 1605 of the Recovery Act would be inconsistent with the public interest.

(c) *Request for determination of inapplicability of section 1605 of the Recovery Act or the Buy American Act.* (1)(i) Any recipient request to use foreign iron, steel, and/or manufactured goods in accordance with paragraph (b)(4) of this section shall include adequate information for Federal Government evaluation of the request, including—

(A) A description of the foreign and domestic iron, steel, and/or manufactured goods;

(B) Unit of measure;

(C) Quantity;

(D) Cost;

(E) Time of delivery or availability;

(F) Location of the project;

(G) Name and address of the proposed supplier; and

(H) A detailed justification of the reason for use of foreign iron, steel, and/or manufactured goods cited in accordance with paragraph (b)(4) of this section.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed cost comparison table in the format in paragraph (d) of this section.

(iii) The cost of iron, steel, or manufactured goods shall include all delivery costs to the construction site and any applicable duty.

(iv) Any recipient request for a determination submitted after Recovery Act funds have been obligated for a project for construction, alteration, maintenance, or repair shall explain why the recipient could not reasonably foresee the need for such determination and could not have requested the determination before the funds were obligated. If the recipient does not submit a satisfactory explanation, the award official need not make a determination.

(2) If the Federal Government determines after funds have been obligated for a project for construction, alteration, maintenance, or repair that an exception to section 1605 of the Recovery Act applies, the award official will amend the award to allow use of the foreign iron, steel, and/or relevant manufactured goods. When the basis for the exception is nonavailability or public interest, the amended award shall reflect adjustment of the award amount, redistribution of budgeted funds, and/or other appropriate actions taken to cover costs associated with acquiring or using the foreign iron, steel, and/or relevant manufactured goods.. When the basis for the exception is the unreasonable cost of the domestic iron, steel, or manufactured goods, the award official shall adjust the award amount or redistribute budgeted funds, as appropriate, by at least the differential established in 2 CFR 176.110(a).

(3) Unless the Federal Government determines that an exception to section 1605 of the Recovery Act applies, use of foreign iron, steel, and/or manufactured goods other than designated country iron, steel, and/or manufactured goods is noncompliant with the applicable Act.

(d) *Data.* To permit evaluation of requests under paragraph (b) of this section based on unreasonable cost, the applicant shall include the following information and any applicable supporting data based on the survey of suppliers:

FOREIGN AND DOMESTIC ITEMS COST COMPARISON

Description	Unit of measure	Quantity	Cost (dollars)*
Item 1:			
Foreign steel, iron, or manufactured good			
Domestic steel, iron, or manufactured good			
Item 2:			
Foreign steel, iron, or manufactured good			
Domestic steel, iron, or manufactured good			

[List name, address, telephone number, email address, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.]
[Include other applicable supporting information.]
*[*Include all delivery costs to the construction site.]*

§ 176.170 Notice of Required Use of American Iron, Steel, and Manufactured Goods (covered under International Agreements)—Section 1605 of the American Recovery and Reinvestment Act of 2009.

When requesting applications or proposals for Recovery Act programs or activities that may involve construction, alteration, maintenance, or repair of a public building or public work, and involve iron, steel, and/or manufactured goods covered under international agreements, the agency shall use the notice described in the following paragraphs in the solicitation:

(a) *Definitions. Designated country iron, steel, and/or manufactured goods, foreign iron, steel, and/or manufactured good, manufactured good, public building* and *public work*, and *steel*, as used in this provision, are defined in 2 CFR 176.160(a).

(b) *Requests for determinations of inapplicability.* A prospective applicant requesting a determination regarding the inapplicability of section 1605 of the American Recovery and Reinvestment Act of 2009 (Pub. L. 111–5) (Recovery Act) should submit the request to the award official in time to allow a determination before submission of applications or proposals. The prospective applicant shall include the information and applicable supporting data required by 2 CFR 176.160 (c) and (d) in the request. If an applicant has not requested a determination regarding the inapplicability of section 1605 of the Recovery Act before submitting its application or proposal, or has not received a response to a previous request, the applicant shall include the information and supporting data in the application or proposal.

(c) *Evaluation of project proposals.* If the Federal Government determines that an exception based on unreasonable cost of domestic iron, steel, and/or manufactured goods applies, the Federal Government will evaluate a project requesting exception to the requirements of section 1605 of the Recovery Act by adding to the estimated total cost of the project 25 percent of the project cost if foreign iron, steel, or manufactured goods are used based on unreasonable cost of comparable domestic iron, steel, or manufactured goods.

(d) *Alternate project proposals.* (1) When a project proposal includes foreign iron, steel, and/or manufactured goods, other than designated country iron, steel, and/or manufactured goods, that are not listed by the Federal Government in this Buy American notice in the request for applications or proposals, the applicant may submit an alternate proposal based on use of equivalent domestic or designated country iron, steel, and/or manufactured goods.

(2) If an alternate proposal is submitted, the applicant shall submit a separate cost comparison table prepared in accordance with paragraphs 2 CFR 176.160(c) and (d) for the proposal that is based on the use of any foreign iron, steel, and/or manufactured goods for which the Federal Government has not yet determined an exception applies.

(3) If the Federal Government determines that a particular exception requested in accordance with 2 CFR 176.160(b) does not apply, the Federal Government will evaluate only those proposals based on use of the equivalent domestic or designated country iron, steel, and/or manufactured goods, and the applicant shall be required to furnish such domestic or designated country items.

Appendix to Subpart B of Part 176—U.S. States, Other Sub-Federal Entities, and Other Entities Subject to U.S. Obligations Under International Agreements

States	Entities covered	Exclusions	Relevant international agreements
Arizona	Executive branch agencies		—WTO GPA (except Canada). —U.S.-Chile FTA. —U.S.-Singapore FTA.
Arkansas	Executive branch agencies, including universities but excluding the Office of Fish and Game.	construction services	—WTO GPA (except Canada). —DR–CAFTA. —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —US.-Peru TPA. —U.S.-Singapore FTA.
California	Executive branch agencies		—WTO GPA (except Canada). —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Singapore FTA.
Colorado	Executive branch agencies		—WTO GPA (except Canada). —DR–CAFTA. —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Peru TPA.

States	Entities covered	Exclusions	Relevant international agreements
Connecticut	—Department of Administrative Services. —Department of Transportation. —Department of Public Works. —Constituent Units of Higher Education.		—U.S.-Singapore FTA. —WTO GPA (except Canada). —DR–CAFTA. —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Singapore FTA.
Delaware	—Administrative Services (Central Procurement Agency). —State Universities. —State Colleges.	construction-grade steel (including requirements on subcontracts); motor vehicles; coal.	—WTO GPA (except Canada). —DR–CAFTA (except Honduras). —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Singapore FTA.
Florida	Executive branch agencies	construction-grade steel (including requirements on subcontracts); motor vehicles; coal.	—WTO GPA (except Canada). —DR–CAFTA. —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Peru TPA. —U.S.-Singapore FTA.
Georgia	—Department of Administrative Services —Georgia Technology Authority.	beef; compost; mulch	—U.S.-Australia FTA.
Hawaii	Department of Accounting and General Services.	software developed in the state; construction.	—WTO GPA (except Canada). —DR–CAFTA (except Honduras). —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Singapore FTA.
Idaho	Central Procurement Agency (including all colleges and universities subject to central purchasing oversight).		—WTO GPA (except Canada). —DR–CAFTA (except Honduras). —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Singapore FTA.
Illinois	—Department of Central Management Services.	construction-grade steel (including requirements on subcontracts); motor vehicles; coal.	—WTO GPA (except Canada). —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Peru TPA. —U.S.-Singapore FTA. —U.S.-EC Exchange of Letters (applies to EC Member States for procurement not covered by WTO GPA and only where the state considers out-of-state suppliers).
Iowa	—Department of General Services —Department of Transportation. —Board of Regents' Institutions (universities).	construction-grade steel (including requirements on subcontracts); motor vehicles; coal.	—WTO GPA (except Canada). —U.S.-Chile FTA. —U.S.-Singapore FTA.
Kansas	Executive branch agencies	construction services; automobiles; aircraft.	—WTO GPA (except Canada). —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Singapore FTA.
Kentucky	Division of Purchases, Finance and Administration Cabinet.	construction projects	—WTO GPA (except Canada). —DR–CAFTA. —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Singapore FTA.
Louisiana	Executive branch agencies		—WTO GPA (except Canada). —DR–CAFTA. —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Singapore FTA.

States	Entities covered	Exclusions	Relevant international agreements
Maine	—Department of Administrative and Financial Services. —Bureau of General Services (covering state government agencies and school construction). —Department of Transportation.	construction-grade steel (including requirements on subcontracts); motor vehicles; coal.	—WTO GPA (except Canada). —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Singapore FTA.
Maryland	—Office of the Treasury. —Department of the Environment. —Department of General Services. —Department of Housing and Community Development. —Department of Human Resources. —Department of Licensing and Regulation. —Department of Natural Resources. —Department of Public Safety and Correctional Services. —Department of Personnel. —Department of Transportation.	construction-grade steel (including requirements on subcontracts); motor vehicles; coal.	—WTO GPA (except Canada). —DR–CAFTA. —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Singapore FTA.
Massachusetts	—Executive Office for Administration and Finance. —Executive Office of Communities and Development. —Executive Office of Consumer Affairs. —Executive Office of Economic Affairs. —Executive Office of Education. —Executive Office of Elder Affairs. —Executive Office of Environmental Affairs. —Executive Office of Health and Human Service. —Executive Office of Labor. —Executive Office of Public Safety. —Executive Office of Transportation and Construction.		—WTO GPA (except Canada). —U.S.-Chile FTA. —U.S.-Singapore FTA.
Michigan	Department of Management and Budget.	construction-grade steel (including requirements on subcontracts); motor vehicles; coal.	—WTO GPA (except Canada). —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Singapore FTA.
Minnesota	Executive branch agencies		—WTO GPA (except Canada). —U.S.-Chile FTA. —U.S.-Singapore FTA.
Mississippi	Department of Finance and Administration.	services	—WTO GPA (except Canada). —DR–CAFTA. —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Peru TPA. —U.S.-Singapore FTA.
Missouri	—Office of Administration —Division of Purchasing and Materials Management.		—WTO GPA (except Canada). —U.S.-Chile FTA. —U.S.-Singapore FTA.
Montana	Executive branch agencies	goods	—WTO GPA (except Canada). —U.S.-Chile FTA. —U.S.-Singapore FTA.
Nebraska	Central Procurement Agency		—WTO GPA (except Canada). —DR–CAFTA. —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Singapore FTA.
New Hampshire	Central Procurement Agency	construction-grade steel (including requirements on subcontracts), motor vehicles; coal.	—WTO GPA (except Canada). —DR–CAFTA. —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Singapore FTA.

States	Entities covered	Exclusions	Relevant international agreements
New York	—State agencies. —State university system. —Public authorities and public benefit corporations, with the exception of those entities with multi-state mandates.	construction-grade steel (including requirements on subcontracts); motor vehicles; coal; transit cars, buses and related equipment.	—WTO GPA (except Canada). —DR–CAFTA. —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Peru TPA. —U.S.-Singapore FTA.
North Dakota			—U.S.-EC Exchange of Letters (applies to EC Member States and only where the state considers out-of-state suppliers).
Oklahoma	Department of Central Services and all state agencies and departments subject to the Oklahoma Central Purchasing Act.	construction services; construction-grade steel (including requirements on subcontracts); motor vehicles; coal.	—WTO GPA (except Canada). —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Peru TPA. —U.S.-Singapore FTA.
Oregon	Department of Administrative Services.		—WTO GPA (except Canada). —DR–CAFTA (except Honduras). —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Singapore FTA.
Pennsylvania	Executive branch agencies, including: —Governor's Office. —Department of the Auditor General. —Treasury Department. —Department of Agriculture. —Department of Banking. —Pennsylvania Securities Commission. —Department of Health. —Department of Transportation. —Insurance Department. —Department of Aging. —Department of Correction. —Department of Labor and Industry. —Department of Military Affairs. —Office of Attorney General. —Department of General Services. —Department of Education. —Public Utility Commission. —Department of Revenue. —Department of State. —Pennsylvania State Police. —Department of Public Welfare. —Fish Commission. —Game Commission. —Department of Commerce. —Board of Probation and Parole. —Liquor Control Board. —Milk Marketing Board. —Lieutenant Governor's Office. —Department of Community Affairs. —Pennsylvania Historical and Museum Commission. —Pennsylvania Emergency Management Agency. —State Civil Service Commission. —Pennsylvania Public Television Network. —Department of Environmental Resources. —State Tax Equalization Board. —Department of Public Welfare. —State Employees' Retirement System. —Pennsylvania Municipal Retirement Board.	construction-grade steel (including requirements on subcontracts); motor vehicles; coal.	—WTO GPA (except Canada). —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Singapore FTA.

States	Entities covered	Exclusions	Relevant international agreements
	—Public School Employees' Retirement System. —Pennsylvania Crime Commission. —Executive Offices.		
Rhode Island	Executive branch agencies	boats, automobiles, buses and related equipment.	—WTO GPA (except Canada). —DR–CAFTA (except Honduras). —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Singapore FTA.
South Dakota	Central Procuring Agency (including universities and penal institutions).	beef	—WTO GPA (except Canada). —DR–CAFTA. —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Singapore FTA.
Tennessee	Executive branch agencies	Services; construction	—WTO GPA (except Canada). —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Singapore FTA.
Texas	Texas Building and Procurement Commission.		—WTO GPA (except Canada). —DR–CAFTA. —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Peru TPA. —U.S.-Singapore FTA.
Utah	Executive branch agencies		—WTO GPA (except Canada). —DR–CAFTA (except Honduras). —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Peru TPA. —U.S.-Singapore FTA.
Vermont	Executive branch agencies		—WTO GPA (except Canada). —DR–CAFTA. —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Singapore FTA.
Washington	Executive branch agencies, including: —General Administration. —Department of Transportation. —State Universities.	fuel; paper products; boats; ships; and vessels.	—WTO GPA (except Canada). —DR–CAFTA. —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Singapore FTA.
West Virginia			—U.S.-EC Exchange of Letters (applies to EC Member States and only where the state considers out-of-state suppliers).
Wisconsin	Executive branch agencies, including: —Department of Administration. —State Correctional Institutions. —Department of Development. —Educational Communications Board. —Department of Employment Relations. —State Historical Society. —Department of Health and Social Services. —Insurance Commissioner. —Department of Justice. —Lottery Board. —Department of Natural Resources. —Administration for Public Instruction.		—WTO GPA (except Canada). —U.S.-Chile FTA. —U.S.-Singapore FTA.

States	Entities covered	Exclusions	Relevant international agreements
Wyoming	—Racing Board. —Department of Revenue. —State Fair Park Board. —Department of Transportation. —State University System. —Procurement Services Division —Wyoming Department of Transportation. —University of Wyoming	construction-grade steel (including requirements on subcontracts); motor vehicles; coal.	—WTO GPA (except Canada). —DR–CAFTA. —U.S.-Australia FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Singapore FTA.
Other sub-federal entities	**Entities covered**	**Exclusions**	**Relevant international agreements**
Puerto Rico	—Department of State —Department of Justice. —Department of the Treasury. —Department of Economic Development and Commerce. —Department of Labor and Human Resources. —Department of Natural and Environmental Resources. —Department of Consumer Affairs. —Department of Sports and Recreation.	construction services	—DR–CAFTA. —U.S.-Peru TPA.
Port Authority of New York and New Jersey.		restrictions attached to Federal funds for airport projects; maintenance, repair and operating materials and supplies.	—WTO GPA (except Canada). —U.S.-Chile FTA. —U.S.-Singapore FTA.
Port of Baltimore		restrictions attached to Federal funds for airport projects.	—WTO GPA (except Canada). —U.S.-Chile FTA. —U.S.-Singapore FTA.
New York Power Authority		restrictions attached to Federal funds for airport projects; conditions specified for the State of New York.	—WTO GPA (except Canada). —U.S.-Chile FTA. —U.S.-Singapore FTA.
Massachusetts Port Authority			U.S.-EC Exchange of Letters (applies to EC Member States and only where the Port Authority considers out-of-state suppliers).
Boston, Chicago, Dallas, Detroit, Indianapolis, Nashville, and San Antonio.			U.S.-EC Exchange of Letters (only applies to EC Member States and where the city considers out-of-city suppliers).
Other entities	**Entities covered**	**Exclusions**	**Relevant international agreements**
Rural Utilities Service (waiver of Buy American restriction on financing for all power generation projects).			—WTO GPA. —DR–CAFTA. —NAFTA. —U.S.-Australia FTA. —U.S.-Bahrain FTA. —U.S.-Chile FTA. —U.S.-Morocco FTA. —U.S.-Oman FTA. —U.S.-Peru TPA. —U.S.-Singapore FTA.
Rural Utilities Service (waiver of Buy American restriction on financing for telecommunications projects).			—NAFTA. —U.S.-Israel FTA.

General Exceptions: The following restrictions and exceptions are excluded from U.S. obligations under international agreements:

1. The restrictions attached to Federal funds to states for mass transit and highway projects.

2. Dredging.

The World Trade Organization Government Procurement Agreement (WTO GPA) Parties: Aruba, Austria, Canada, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea (Republic of), Latvia, Liechtenstein, Lithuania,

Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, and United Kingdom.

The Free Trade Agreements and the respective Parties to the agreements are:

(1) Dominican Republic-Central America-United States Free Trade Agreement (DR-CAFTA): Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, and Nicaragua;

(2) North American Free Trade Agreement (NAFTA): Canada and Mexico;

(3) United States-Australia Free Trade Agreement (U.S.-Australia FTA);

(4) United States-Bahrain Free Trade Agreement (U.S.-Bahrain FTA);

(5) United States-Chile Free Trade Agreement (U.S.-Chile FTA);

(6) United States-Israel Free Trade Agreement (U.S.-Israel FTA);

(7) United States-Morocco Free Trade Agreement (U.S.-Morocco FTA);

(8) United States-Oman Free Trade Agreement (U.S.-Oman FTA);

(9) United States-Peru Trade Promotion Agreement (U.S.-Peru TPA); and

(10) United States-Singapore Free Trade Agreement (U.S.-Singapore FTA).

United States-European Communities Exchange of Letters (May 30, 1995) (U.S.-EC Exchange of Letters) applies to EC Member States: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, and United Kingdom.

Subpart C—Wage Rate Requirements Under Section 1606 of the American Recovery and Reinvestment Act of 2009

§ 176.180 Procedure.

The award official shall insert the standard award term in this Subpart in all awards funded in whole or in part with Recovery Act funds.

§ 176.190 Award term—Wage Rate Requirements under Section 1606 of the Recovery Act.

When issuing announcements or requesting applications for Recovery Act programs or activities that may involve construction, alteration, maintenance, or repair the agency shall use the award term described in the following paragraphs:

(a) Section 1606 of the Recovery Act requires that all laborers and mechanics employed by contractors and subcontractors on projects funded directly by or assisted in whole or in part by and through the Federal Government pursuant to the Recovery Act shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality as determined by the Secretary of Labor in accordance with subchapter IV of chapter 31 of title 40, United States Code.

Pursuant to Reorganization Plan No. 14 and the Copeland Act, 40 U.S.C. 3145, the Department of Labor has issued regulations at 29 CFR parts 1, 3, and 5 to implement the Davis-Bacon and related Acts. Regulations in 29 CFR 5.5 instruct agencies concerning application of the standard Davis-Bacon contract clauses set forth in that section. Federal agencies providing grants, cooperative agreements, and loans under the Recovery Act shall ensure that the standard Davis-Bacon contract clauses found in 29 CFR 5.5(a) are incorporated in any resultant covered contracts that are in excess of $2,000 for construction, alteration or repair (including painting and decorating).

(b) For additional guidance on the wage rate requirements of section 1606, contact your awarding agency. Recipients of grants, cooperative agreements and loans should direct their initial inquiries concerning the application of Davis-Bacon requirements to a particular federally assisted project to the Federal agency funding the project. The Secretary of Labor retains final coverage authority under Reorganization Plan Number 14.

Subpart D—Single Audit Information for Recipients of Recovery Act Funds

§ 176.200 Procedure.

The award official shall insert the standard award term in this Subpart in all awards funded in whole or in part with Recovery Act funds.

§ 176.210 Award term—Recovery Act Transactions listed in Schedule of Expenditures of Federal Awards and Recipient Responsibilities for Informing Subrecipients.

The award term described in this section shall be used by agencies to clarify recipient responsibilities regarding tracking and documenting Recovery Act expenditures:

(a) To maximize the transparency and accountability of funds authorized under the American Recovery and Reinvestment Act of 2009 (Pub. L. 111-5) (Recovery Act) as required by Congress and in accordance with 2 CFR 215.21 "Uniform Administrative Requirements for Grants and Agreements" and OMB Circular A-102 Common Rules provisions, recipients agree to maintain records that identify adequately the source and application of Recovery Act funds. OMB Circular A-102 is available at *http://www.whitehouse.gov/omb/circulars/a102/a102.html.*

(b) For recipients covered by the Single Audit Act Amendments of 1996 and OMB Circular A-133, "Audits of States, Local Governments, and Non-Profit Organizations," recipients agree to separately identify the expenditures for Federal awards under the Recovery Act on the Schedule of Expenditures of Federal Awards (SEFA) and the Data Collection Form (SF-SAC) required by OMB Circular A-133. OMB Circular A-133 is available at *http://www.whitehouse.gov/omb/circulars/a133/a133.html.* This shall be accomplished by identifying expenditures for Federal awards made under the Recovery Act separately on the SEFA, and as separate rows under Item 9 of Part III on the SF-SAC by CFDA number, and inclusion of the prefix "ARRA-" in identifying the name of the Federal program on the SEFA and as the first characters in Item 9d of Part III on the SF-SAC.

(c) Recipients agree to separately identify to each subrecipient, and document at the time of subaward and at the time of disbursement of funds, the Federal award number, CFDA number, and amount of Recovery Act funds. When a recipient awards Recovery Act funds for an existing program, the information furnished to subrecipients shall distinguish the subawards of incremental Recovery Act funds from regular subawards under the existing program.

(d) Recipients agree to require their subrecipients to include on their SEFA information to specifically identify Recovery Act funding similar to the requirements for the recipient SEFA described above. This information is needed to allow the recipient to properly monitor subrecipient expenditure of ARRA funds as well as oversight by the Federal awarding agencies, Offices of Inspector General and the Government Accountability Office.

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BILLING CODE P

DEPARTMENT OF AGRICULTURE

Agricultural Marketing Service

7 CFR Part 984

[Doc. No. AO-192-A7; AMS-FV-07-0004; FV06-984-1 C]

Walnuts Grown in California; Order Amending Marketing Order No. 984; Correcting Amendment

AGENCY: Agricultural Marketing Service, USDA.

ACTION: Final rule; correcting amendment.

1

DIVISION 1

GENERAL REQUIREMENTS

SECTION 01010

SPECIAL PROVISIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Puetz Road Booster Station; Contract No. 4931-09-01. Booster station building construction including site work, yard piping, mechanical piping, and equipment, HVAC, and other miscellaneous work included herein. Part A--Booster Station Construction and Part B--Transmission Main Construction.

B. Related Sections and Divisions: Applicable provisions of the General Conditions and Supplementary Conditions shall apply to this section.

1.02 CONTRACT DOCUMENTS—INTENT AND USE

A. Intent of Documents:
   1. Singular notations and specifications shall be considered plural where application is reasonably inferred.
   2. Mention or indication of extent of work under any work division or specification section is done only for convenience of Contractor and shall not be construed as describing all work required under that division or section.
   3. Some individual sections may contain a list of related sections. The list of related sections in individual sections is provided for the convenience of Contractor and is not necessarily all-inclusive. Contractor may not rely upon this listing for determination of scope of work. Other sections of the specifications, not referenced in individual sections shall apply as required for proper performance of the work.
   4. Command type sentences may be used in the Contract Documents. These sentences refer to and are directed to Contractor.
   5. Symbols for various elements and systems are shown on the drawings. Should there be any doubt regarding the meaning or intent of the symbols used, a written interpretation shall be obtained from Engineer.

B. Use of Documents:
   1. Contractor shall examine all specifications and drawings for the work, including those that may pertain to work Contractor does not normally perform with its own forces.
   2. Contractor shall use all of the project drawings and specifications:
      a. For a complete understanding of the project.
      b. To determine the type of construction and systems required.
      c. For coordination with other contractors.
      d. To determine what other contractors.
      e. To anticipate and notify others when work by others will be required.
      f. And all other relevant matters related to the project.
   3. Contractor is also bound by all requirements of the Contract Documents which are applicable to, pertain to, or affect its work, as may be shown or inferred by the entire set of project drawings and specifications.

1.03 SPECIAL REQUIREMENTS

A. Driveways and other access to residences, business, or other commercial properties shall be maintained at all times during construction. ***At the time of the preconstruction meeting, the Contractor shall submit a proposed work sequence for Municipal Engineer/Owner approval.***

B. All utilities aboveground or underground that need to be supported during the prosecution of this contract shall be coordinated with the utilities and the cost thereof shall be the sole responsibility of the Contractor.

C. The Contractor shall maintain local traffic in areas not under immediate construction. The Contractor will be responsible for immediate local traffic control signage. The signage and traffic control shall be according to the "Manual on Uniform Traffic Control Devices for Streets and Highways", latest edition. The associated cost shall be included in the appropriate bid item of the Contractor's bid.

D. All trenches within existing or proposed paved or graveled roadways, driveways, sidewalks, and other hard surfaces shall be backfilled with Soil Class C3/C6 and compacted to 95% of modified proctor.

E. Extreme care shall be taken to protect all trees along the construction route, which are not marked for removal or within the right-of-way and easement areas. For damaged trees and trees that die due to construction, the Contractor shall be responsible for the cost of tree replacement up to $1,000 per tree. The total amount shall be deducted from final contract payment.

F. The Contractor will furnish the municipality and Municipal Engineer with a telephone list, including cell or home phone numbers, of key personnel available for after hours and weekend emergencies.

G. At all times, the Contractor shall see that affected work site areas shall be kept drained and free of groundwater and surface water. The Contractor shall dispose of the water so as not to cause injury to public or private property or to cause a nuisance or menace to the public. Additionally, the Contractor shall prevent excessive dust; and he shall, at his own expense, provide adequate dust control measures acceptable to the Municipal Engineer.

H. The Contractor shall implement all erosion control in conformance with the WDNR Conservation Practice Standards (Latest Edition). All existing and installed inlets shall have erosion protection. These items shall be incidental to the project.

I. Restoration

1. All damaged, disturbed, or removed surfaces, structures, or utilities, whether private or public, shall be repaired, restored, and/or replaced to a condition equal to or better than that which existed prior to the start of the work, including all ditches, culverts, roadways, alleyways, field lawns, walkways, retaining walls, fences, buildings, driveways, mailboxes, and any other items that may exist in the construction area.
2. Following initial soil disturbance, all areas shall be restored within one month, weather permitting.
3. All disturbed areas within the right-of-way and outside the paved streets and all easements shall be topsoiled to provide a minimum depth of 6 inches with salvaged topsoil, fine graded, raked free of lumps and stones, seeded and mulched. Any additional

topsoil required to return the site to a condition as good as or better than existing condition shall be the responsibility of the Contractor.

4. All restoration will be considered as incidental to the appropriate construction bid item. Restoration work will not be paid for as a separate item.

J. The owner shall have prior claim to all surplus excavated material. All excess excavate material shall be disposed of on-site as directed by the Owner. The topsoil shall be removed prior to placing the material and replaced when completed. If the Owner does not desire to claim surplus excavated material, the contractor shall be totally responsible for obtaining a disposal site. **NO** material shall be disposed of in a flood plain, wetland, or waterway.

K. Clearing, grubbing, and stripping of the topsoil will be the responsibility of the Contractor, and shall be considered incidental to the appropriate bid item. The topsoil shall be temporarily stockpiled on-site.

L. The subgrade condition and elevation shall be checked by the Municipal Engineer prior to placement of base course material. The base course condition and elevation shall be checked by the Municipal Engineer.

M. Submit list of subcontractors to Municipal Engineer.

N. Removal of concrete sidewalk, bituminous pavements, curb and gutter, and driveway shall include disposal by the Contractor at a site that will accept such material. This work shall be included in the appropriate bid item.

O. Contractor shall not commence work on-site until all materials are approved.

P. Access to mail boxes shall be maintained at all times. If temporary mail box placement or groupings are required, temporary relocation shall be coordinated with the U.S. Postal Service.

Q. Payment requests shall be submitted to the engineer in Excel software form on the form provided in Section C-620, Application for Payment, page C-620-3.

R. In Section 00410, Bid Form, provide an add/deduct conforming to the following: All iron, steel, and manufacturing goods incorporated in the project shall be produced as per requirements in specification section American Recovery and Reinvestment Act (ARRA) "Federal Stimulus Package" special requirements.

S. If federal grant money is utilized on the project, the contractor shall pay the higher of the applicable wage rates between the State of Wisconsin Department of Workforce Development prevailing wage rates and Davis Bacon wage rates as identified in Section 00800, Supplementary Conditions.

T. All permits shall be paid for and obtained by the Contractor.

1.04 OWNER-FURNISHED PRODUCTS

A. Owner is responsible for the following items when supplying material or equipment to Contractor for installation.
   1. Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to Contractor.
   2. Delivery supplier's bill of material to Contractor.
   3. Arrange and pay for delivery to site.
   4. Inspect deliveries jointly with Contractor.
   5. Submit claims for transportation damage and arrange for replacement of damaged, defective or missing items.

B. Contractor's responsibilities for Owner furnished new products are:
   1. Handle products at the site, including uncrating and storage.
   2. Inspect deliveries jointly with Owner.
   3. Protect products from damage and from exposure to the elements.
   4. Assemble, install, correct, adjust, and finish products in accordance with the appropriate section of these specifications.
   5. Contractor shall coordinate manufacturer's services in accordance with Section 01650.
   6. Contractor shall coordinate start-up and training in accordance with Section 01650.
   7. Contractor shall complete all checklists in accordance with Section 11000 and submit to the Engineer.
   8. Repair or replace items damaged by Contractor at no additional cost to Owner.
   9. Contractor's responsibility for materials and equipment furnished by Owner shall begin at the point of delivery to the site. Materials and equipment already on the site shall become Contractor's responsibility on date of Notice to Proceed with Contract.

1.05 WORK SEQUENCE

A. The Contractor shall submit a construction schedule documenting all phases of construction. The construction schedule shall be submitted in accordance with Section 01300, Submittals.

B. Final work to be completed will include site grading and landscaping.

C. Operation and start-up of all equipment must be approved by the Engineer prior to proceeding. Start-up shall be in accordance with Section 01650, Starting of Systems.

D. **PART A**
   1. Remove existing facilities and utilities in conflict with booster station and work items specified to be relocated.
   2. Construct underground piping booster station and out to the couplings. Provide temporary caps on all underground pipes to prevent materials from entering piping. Test all underground piping.
   3. Construct building and appurtenances.
   4. Part B shall complete all underground testing prior to Part A completing site restoration.
   5. Complete all electrical and all SCADA underground work as shown and specified.
   6. Part A is responsible for all site restoration within the construction limits of Puetz Road Reservoir.

E. **PART B**

1. Install the 20-inch water main starting at South Apple Creek Drive on West Orchard Way. Test water main.

2. Install the 4-inch service lateral. Test lateral.

3. Install the two (2) 20-inch water main from ground storage reservoir intake pipe to booster station. Test water main.

4. Part B is responsible for all site restoration within West Orchard Road and South Apple Creek right-of-way.

1.06 CONTRACTOR USE OF SITE

A. General:

1. The "area of the site" referred to in these specifications shall be as shown on the drawings defined as limits of construction.
2. Construction activities shall be confined within the area of the site limits.
3. From the start of work to completion Contractor is responsible for the care of the site and the premises which are affected by operations of work of this Contract.
4. Except for permanent site improvements provided under the Contract, Contractor shall restore property disturbed during the work, to the conditions which previously existed.
5. Work in occupied spaces shall be restricted to specified work and essential activities, such as making necessary connections and extending services or constructing temporary access ways. Such work shall be scheduled in advance with Owner.

B. Parking and Deliveries:

1. Contractor is responsible for control of traffic by vehicles and persons within the limits of its operations.
2. Parking for employees, subcontractors, and agents of Contractor shall be in areas subject to approval of Owner.
3. Access to the site for delivery of construction material or equipment shall be subject to approval of Owner.

C. Work in Private Right-of-Way

1. Whenever the work is to be prosecuted through property for which the Owner has obtained a license, permit, or easement, the Contractor shall abide fully with the terms of the license, permit, or easement, a copy of which is on file with the Owner.
2. Prior to final payment, the Contractor shall send a notice to all easement grantors by certified mail, return receipt requested, a copy of which shall be filed with the Owner. Said notice to be similar to the following:

   The undersigned Contractor has completed the restoration of the construction site on which you have granted an easement for installation of certain utilities and improvements. If said site restoration is not completed to your satisfaction, please contact the Engineer, Robert E. Lee & Associates, Inc., 4664 Golden Pond Park Court, Hobart, WI 54155, in writing, and arrangements will be made immediately to view the site and restore the site in conformance with our contract obligations.

If the Engineer, Robert E. Lee & Associates, Inc., 4664 Golden Pond Park Court, Hobart, WI 54155, does not hear from you in writing within 10 days from the above date, site restoration of your property will be deemed completed and approved by you.

_____
(Name of Contractor)

_____
(Address of Contractor)

Owner shall furnish contractor with names and addresses of easement grantors.

1.07 OWNER OCCUPANCY

A. The Owner will occupy the site during construction.

B. Provide access for state and local review agencies.

1.08 EXISTING SERVICES AND STRUCTURES

A. Interruption of existing services shall be kept to a minimum and shall be limited to times approved by the Owner.

B. The Contractor shall coordinate with Owner and local utility companies in keeping the services in operation and repair any damages to the satisfaction of the Owner and local utility.

C. Contractor shall not interrupt any existing services until written approval is received from the Owner.

D. In accordance with Wisconsin Statute 182, the Contractor shall contact Diggers Hotline prior to beginning any excavations. A call to Diggers Hotline does not absolve the Contractor of the requirements of this statute.

E. Contractor shall proceed with caution in excavating and preparing the site so that the location of existing structures can be determined. Contractor shall keep an accurate record of existing services and structures and provide a copy to the Owner. The record shall include adequate measurements, depths, and conditions.

1.09 PROTECTION OF WORK

A. Contractor shall protect the Owner's property from damage, dust, debris and other resulting construction activities.

B. Contractor shall keep property free from dirt, dust and fumes from construction activities at all times.

C. Property damaged by the Contractor shall be repaired or replaced by the Contractor to the satisfaction of the Owner.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

- END OF SECTION -

SECTION 01020

ALLOWANCES

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section includes project allowances to cover items not precisely determined by the Owner prior to bidding. The allowances shall be included in the lump sum base bid price.

B. Related Sections and Divisions: Applicable provisions of the General Conditions shall govern the work in this section.

C. If the cost of materials, service or equipment exceeds that set forth above, the Contractor shall be reimbursed for the additional cost by the Owner. If the cost of materials, services or equipment is less than as set forth above, the Owner shall be credited for the difference between cost as stated below and actual cost.

1.02 SCHEDULE OF ALLOWANCES

PART A—Booster Station Construction

1.	Testing	$ 2,500.00
2.	Engineering Review	$ 2,500.00
3.	Natural Gas Utility	$ 10,000.00
4.	Telephone	$ 5,000.00
5.	Electrical Service[1]	$ 85,000.00
6.	SCADA Upgrade[2]	$ 50,000.00
	TOTAL	$235,000.00

[1]See Specification Section 16011, Utility Services.

[2]To integrate pump station to other facilities.

1.03 ALLOWANCE DESCRIPTION

A. Costs included in allowances: Cost of product to Contractor or Subcontractor, less applicable trade discounts; include delivery to site and applicable taxes.

B. Compensation to the Contractor shall be for the direct costs only and shall not include any Contractor mark-ups on services except additional bond costs if the Allowance total is exceeded. Costs not included in the allowance: Unless specified otherwise, allowances DO NOT include costs for product handling at the site, including unloading, uncrating, and storage; protection of products from elements and from damage; labor for installation and finishing. These costs SHALL BE included in the Base Bid Price and no demand for additional payment on account of any thereof will be valid.

C. Engineer Responsibilities
1. Consult with Contractor in consideration and selection of products, suppliers and installers.
2. Select products in consultation with Owner and transmit decision to Contractor.
3. Prepare change order, if required.

D. Contractor Responsibilities
   1. On notification of selection by Engineer, execute purchase order with designated equipment supplier.
   2. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
   3. Promptly inspect products upon delivery for completeness, damage and defects. Submit claims for transportation damage.

1.04 TESTING ALLOWANCES

A. Costs included in allowances: Cost of engaging an inspection or testing firm, execution of inspection or tests, reporting results for conducting Owner-quality assurance testing only.

1.05 ENGINEERING REVIEW

A. This allowance item covers the cost for the Engineer to assist the Owner in conducting an engineering review.
   1. Bidders understand that the Owner reserves the right to perform an engineering review after the contract award. The purpose of the engineering review is to develop cost savings through contractor input and the review of substitute material and equipment.
   2. Bidders understand and agree that if they are the apparent low bidder, they will assist the Engineer and Owner in performing the engineering review.
   3. The Bidders understand and agree to provide cost savings alternatives to the project should the Owner make request as part of the Value Determination.
   4. The base bid price will be adjusted by change order according to the engineering review.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

- END OF SECTION -

SECTION 01050

FIELD ENGINEERING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Work under this section is associated with:
   1. Staking.
   2. Profile and topography.
   3. Records and markers.

1.02 STAKING PROVIDED BY OWNER'S REPRESENTATIVE

A. Staking for utility construction shall include:
   1. Location of construction limits.
   2. Original staking of line and grade and location of all structures.
   3. Benchmarks on site.

B. Staking for building construction.
   1. Two construction baselines
   2. Establish benchmarks onsite.
   3. Location of construction limits.

1.03 STAKING TO BE PROVIDED BY CONTRACTOR

A. Any staking work required to complete the work and not specifically provided by the Owner's representative.

B. Contractor shall establish grade from stakes or benchmarks established by the Owner's representative.

1.04 CONSTRUCTION STAKING

A. The Contractor shall provide the Owner's representative an advance notification of three working days when requesting construction staking.

B. All construction shall be completed by the Contractor according to the alignments, grades, and baselines as established and set by the Owner's representative.

C. The Contractor shall be responsible for the cost of restaking baselines, line & grade, structures & benchmarks unnecessarily destroyed or altered as a result of his negligence during the construction period.

1.05 PROFILE AND TOPOGRAPHY

A. Contours or profiles of the ground are shown on the drawings. These profiles and contours are reasonably correct, but are not guaranteed to be absolutely so, and together with any schedule of quantities are presented only as an approximation.

1.06 CONTRACTORS RECORDS AND MARKERS

A. In addition to submittals and records required in other parts of the Contract Documents, Contractor shall record the following in such a manner that the Owner can locate same in the future by reference to recorded measurements:
   1. Any deviations of underground covered work from contract drawings.
   2. On pipeline construction, the exact location and depth below grade of all:
      a. Valves and pipelines.
      b. Changes in direction.
      c. or "T" branches on sewers.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

- END OF SECTION -

SECTION 01060

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section includes regulatory requirements in regard to the project. Regulatory agency's requirements supersede this section.

B. Related Sections and Divisions: Applicable provisions of the General Conditions shall govern the work in this section.

1.02 OSHA REQUIREMENTS

A. All work including site safety, equipment, materials and fabricated items provided by the Contractor shall comply with all OSHA requirements.

1.03 PERMITS

A. The Contractor shall obtain all permits required for this project. Where the permit requirements of any permit are more restrictive than the plans and specifications, the permit requirements shall govern.

B. Contractor shall obtain required permits from all regulatory governmental agencies governing dewatering. Contractor shall be responsible to maintain existing private wells affected by dewatering activities. It shall be the responsibility of the Contractor to provide a water supply to the affected resident at no cost to the Owner. The Contractor shall be required to drill and close wells in accordance with WDNR requirement.

The governing agency in Wisconsin is:

Wisconsin Department of Natural Resources
Private Water Supply Section
P.O. Box 7921
Madison, Wisconsin 53707

C. Contractor shall comply with the WDNR requirements regulating the discharge of effluent from construction trenches. These provisions provide for the removal of suspended solids prior to direct discharge to surface water or wetlands. Contractor shall be responsible for obtaining any necessary permits.

1.04 UNDERGROUND UTILITIES

A. Under the provisions of Wisconsin Statutes, Section 182.0175, all contractors, subcontractors, and any firm or individual intending to do work on this contract shall contact all utility firms in the affected area of construction a minimum of three (3) working days prior to beginning construction so that affected utilities will be located and marked.

1.05 PROPERTY MONUMENTS

A. It shall be the responsibility of the Contractor to protect iron pipe and survey monuments from movement where possible. The cost of replacement of any monuments moved or destroyed by the Contractor shall be assessed to him.

1.06 WAGE RATES

A. Not less than the prevailing wage rates shall be paid to the workers employed on this project.

B. Contractor shall comply with the State or Federal wage rates governing this project.

C. The wage rates for this project are provided in the Contract Documents.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

- END OF SECTION -

SECTION 01157

MEASUREMENT AND PAYMENT
UNIT PRICE BID ITEMS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section specifies requirements for following:
   1. Method of measurement.
   2. Method of payment.

B. The supplemental bid items listed are in addition to the scope of work as shown on the drawings and described in the specifications.

1.02 CONTRACT ITEMS

A. Over excavation/Backfill
   1. The unit price per cubic yard shall include all materials, labor, tools and equipment required for excess excavation, removal and off-site disposal of unsuitable soils and the placing, spreading and compacting of Class C- I fill material. Unsuitable soils shall be excavated to a depth as determined by the soils report and Engineer.
   2. Measurement for payment shall be made by the Engineer using appropriate volume calculations of the "cut" material, in-place.
   3. Payment shall be made per cubic yard of "cut" material, "in-place".
   4. The unit price payment shall be made for all excavation and backfill required per the soils report and as shown on the plans.

B. Rock Removal
   1. The unit price per cubic yard in addition to that shown in the soil boring, if applicable shall include all materials, labor, tools and equipment required for rock removal.
   2. Measurement shall be made by the Engineer using appropriate volume calculations of the "cut" material.
   3. Payment shall be made per cubic yard.

C. Asphaltic Concrete Pavement and Patch
   1. These items consist of the following:
      a. Asphalt work in areas requiring full lane width removals.
      b. Asphalt patches (including driveway patches) in trench areas only.
   2. Unit payment – listed respectively.
      a. Full lane width removal areas – square yard.
   3. Measurement:
      a. Square yard: measurement shall be based on the following:
         1) Determine by measuring the area of bituminous pavement compacted in place.
         2) Delivery tickets submitted daily.
   4. Thickness shall be as shown on the plans, or if not shown, then as required in Section 02505, Asphaltic Concrete Pavement.

5. The following work shall be included in the unit price and will be considered incidental cost items:
   a. Furnishing, placing, spreading, and compacting asphalt as required in Section 02505, Asphaltic Concrete Pavement.
   b. Site restoration.
   c. Restoring pavement areas damaged outside trench "Pay Width".
   d. Prepare edges for paving by sawcutting as required in Section 02203, Cutting and Patching (Roadways).
   e. Furnishing and applying a tack coat between the binder course and surface course as needed and directed by the engineer.
6. Density Deficiency
   a. Density shall be measured by averaging the nuclear density test required for a day's production placed.
   b. Should the average density fall below specified densities, the Owner may accept the deficient work in accordance with the terms of Section 00700, Standard General Conditions of the Construction Contract. Payment will be made at an adjusted price as specified in the following table:

PERCENT DENSITY BELOW SPECIFIED MINIMUM	PAYMENT FACTOR (PERCENT OF CONTRACT PRICE)
From 0.5 to 1.0 inclusive	95%
From 1.1 to 1.5 inclusive	85%

   c. If the specified density deficiency is greater than 1.5%, the material shall be removed and replaced with a mixture to the specified density and, when acceptably replaced, will be paid for at the contract unit price.

7. Thickness Deficiency
   a. Thickness deficiency shall be verified using theoretical tonnage. If the in place tonnage is greater than 10 percent below the theoretical tonnage the following shall apply.
      1. Thickness shall be measured by averaging four (4) core samples taken after the final course has been compacted in place. Sample locations shall be determined by the Engineer.
      2. The unit price per square yard will be computed proportional to the average thickness of four cores as follows:

Deficiency in Thickness Determined By:

Cores in Inches	Percent of Unit Price Allowed
0.00 to 0.125	95%
0.126 to 0.25	85%

      3. If the thickness deficiency is greater than 0.25 inches, the material shall be removed and replaced with a mixture to the specified thickness, and when acceptably replaced, will be paid for at the contract unit price.

D. Crushed Aggregate Base Course
   1. These items consist of crushed aggregate base course quantities as follows:
      a. Along roads and alleys requiring full lane width replacement. Also, along shoulders unless paid for under separate bid item.

2. Unit payment - listed respectively:
   a. Full lane-width removal areas – square yard, unless paid for under separate bid item.
3. Measurement:
   a. Square Yard: Measurement shall be based on the following:
      1) Determine by measuring the area of crushed aggregate base course compacted in place per plan details.
4. The following work shall be included in the unit price and will be considered incidental cost items:
   a. All necessary excavation, shaping, fine grading, and compacting to attain the required cross-sectional contour.
   b. Prepare edges for paving by sawcutting as required in Section 02203, Cutting and Patching (Roadways).
   c. Base course material as required in Section 02235, Crushed Aggregate Base Course.
   d. Where full lane width replacement is required, all excavation of surface and base materials, shaping, fine grading and compaction outside the trench width as necessary to attain the required cross-sectional contour.

E. Sidewalk
1. This item includes replacing sidewalk in allowable trench areas and new sidewalk where shown on the plans, all in accordance with Section 02775, Concrete Sidewalk and Driveway Construction.
2. Unit payment - square foot.
3. Measurement shall be made along the edge of concrete for sidewalks. Area will be calculated based on actual length and width. Irregular shaped pours will be calculated based on the average length and width.
4. Thickness and width shall be as shown on the plans or as required in Section 02220, Trenching, Backfilling and Compacting.
5. The following work shall be included in the unit price and will be considered incidental cost items:
   a. Excavation and preparation of foundation including furnishing aggregate base.
   b. Forming.
   c. Placing and finishing concrete.
   d. Concrete material.
   e. Site restoration.
   f. Handicap ramps (excluding curb).
   g. Sidewalk steps.
   h. Expansion and contraction joints.
   i. Sawcutting as required by Section 02203, Cutting and Patching (Roadways)

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 – EXECUTION

NOT APPLICABLE

- END OF SECTION -

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section includes all project meetings required during construction.

B. Related Sections and Divisions:
   1. Applicable provisions of the General Conditions shall govern the work in this section.
   2. Section 01300 – Submittals.
   3. All related equipment specifications.

1.02 MEETINGS

A. Project meetings will be held throughout the project at intervals agreed to by the Engineer, Owner and Contractor.

B. Contractor's project manager, job superintendent, subcontractors and necessary equipment suppiers shall attend the project meetings, as appropriate. Contractor's representative shall have the authority to bind the Contractor to decisions at the meeting.

C. The following meetings, at a minimum shall be attended by the Contractor representatives, Engineer, and Owner:
   1. Preconstruction Meeting
   2. Monthly Progress Meeting
   3. Project Close-Out Meeting

D. Notice of meetings shall be mailed to those required to attend and copies to interested parties such as suppliers and governmental agencies.

E. The Engineer shall be responsible for the mailing of meeting notices, meeting agenda and meeting minutes.

F. The Contractor shall submit typed reports detailing the project schedule, schedule compliance and future construction plans affecting the project schedule at the project meetings. The Contractor shall keep the project schedule updated throughout the construction period.

1.03 EQUIPMENT INSTALLATION AND START-UP MEETINGS

A. When required in the individual specification sections, the Contractor shall coordinate an equipment installation meeting prior to beginning the work.

B. When required in the individual specification sections, the Contractor shall coordinate a start-up meeting prior to start-up of the equipment.

C. Contractor shall be responsible for the mailing of meeting notice, meeting agenda and meeting minutes.

D. Contractor shall be responsible for coordinating the attendance of all parties involved in the work.

E. Contractor shall notify the Engineer at least 7 days prior to the meeting date.

F. Contractor shall record the meeting minutes and distribute within 3 working days after the meeting.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

- END OF SECTION -

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This Section includes administrative and procedural requirements for submittals required for performance of the work, including the following:
   1. Contractor's progress schedule.
   2. Submittal schedule.
   3. Shop drawings.
   4. Submittal Transmittal Data Sheet.
   5. Product data.
   6. Samples.
   7. Quality assurance submittals.

B. Related Sections and Divisions:
   1. Applicable provisions of the General Conditions shall govern the work in this section.
   2. Requirements for submittals are described in other sections of the specifications.

1.02 IDENTIFICATION OF SUBMITTALS

A. The Contractor shall mark each submittal and re-submittal by providing the information described in 1.06, Submittal Transmittal Data Sheet.

B. The Contractor shall stamp each submittal indicating that submittal was reviewed by the Contractor and meets the requirements of the plans and specifications. Unstamped submittals will not be reviewed by the Engineer and returned.

1.03 CONSTRUCTION SCHEDULE

A. The Contractor shall prepare and submit a detailed progress schedule in accordance with the General Conditions. The construction schedule shall be of sufficient detail to assure adequate planning and execution of the work and provide an appropriate basis for monitoring and evaluation of the progress of work.

B. The progress schedule shall indicate the sequence of all work including the start date, completion date and duration.

C. The progress schedule shall incorporate shop drawing and sample submittals schedule.

D. If, at any time during the Project, Contractor fails to complete an activity by its latest scheduled completion date, Contractor shall, within 3 working days of notification by Engineer, submit to Engineer written statement as to how and when work force will be reorganized to return Contract to current schedule.

E. When it becomes apparent from progress evaluation and updated schedule data that milestone completion or Contract completion dates will not be met, Contractor shall take some or all of following actions.
   1. Increase construction staffing in such quantities and crafts as shall substantially eliminate backlog of work.
   2. Increase number of working hours per shift, shifts per work day, work days per week, or amount of construction equipment, or combination thereof sufficient to substantially eliminate backlog of work.
   3. Reschedule work items to achieve concurrency of accomplishments.

F. Addition of equipment or construction forces, increasing working hours or other method, manner or procedures to return to current Construction Progress Schedule will not be considered justification for amending Contract Documents or treated as acceleration.

G. The progress schedule shall be updated throughout the construction period. The Contractor shall revise the schedule monthly and submit with the monthly payment request. The progress schedule will be reviewed at the monthly construction progress meetings.

1.04 SUBMITTAL SCHEDULE

A. Contractor shall make all submittals far enough in advance of scheduled installation dates to ensure adequate time for review and approval by the Engineer. This schedule shall also take into account possible revisions and resubmittals.

B. To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for resubmittals.
   1. Allow 4 weeks for submittals.
   2. Allow 2 weeks for re-submittals.
   3. No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the work to permit processing

1.05 SHOP DRAWINGS

A. All shop drawings shall be addressed to shop drawing coordinator at Robert E. Lee & Associates. The shop drawing coordinator will be identified at the pre-construction meeting.

B. Shop drawings shall be submitted under an industrial submittal transmittal data sheet as described in 1.06.

C. Shop drawings shall include technical data including drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements and other pertinent data. Shop drawings shall be submitted for all manufactured or fabricated items.

D. Shop drawings shall be checked, approved and stamped by the Contractor in accordance with the General Conditions before submitting to the Engineer for review and approval.

E. Submit one correctable, translucent, reproducible print and one blue or black-line print for the Engineer/Architect's review. The Engineer/Architect will indicate and will return the reproducible print. Keep one print with the Record Drawings.

F. Do not use shop drawings without an appropriate final stamp indicating action taken.

G. Except for submittals for the record or information, where action and return is required, the Engineer shall review each submittal, mark to indicate action taken, and return promptly. The Engineer/Architect will stamp each submittal with a uniform action stamp. The Engineer/Architect will mark the stamp appropriately to indicate the action taken, as follows:
   1. "No Exceptions Taken": The work covered by the submittal may proceed provided it complies with requirements of the Contract Documents.
   2. "Make Corrections Noted": The work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents.
   3. "Revise and Resubmit": Do not proceed with work covered by the submittal. Resubmit without delay. Do not use, or allow others to use, submittals marked "Revise and Resubmit" at the Project Site or elsewhere where work is in progress.
   4. "Rejected": Do not proceed with work covered by the submittal. Resubmit without delay. Do not use, or allow others to use, submittals marked "Rejected" at the Project Site or elsewhere where work is in progress.
   5. "Submit Specified Item": Item submitted does not meet specifications. Submit exact item specified.

H. Shop drawings that require resubmission shall be revised as follows:
   1. Revise initial drawings and data and resubmit as required.
   2. Provide an itemized list of all changes other than those requested by the Engineer in the cover letter.

1.06 SUBMITTAL TRANSMITTAL DATA SHEET

A. The Contractor shall submit a submittal transmittal data sheet for each shop drawing. Refer to the form at the end of this section.

B. Each shop drawing shall be submitted under its own submittal transmittal data sheet. If more than one shop drawing is submitted on one sheet, the submittal will be rejected and returned.

C. The submittal transmittal data Sheet must be filled out correctly or the submittal will be returned. The following information MUST be included:
   1. Date.
   2. Project Name.
   3. Contractor.
   4. Submittal Number.
   5. Previous Submittal Number, if applicable.
   6. Specification Section Number.
   7. Submittal for.
   8. Information Block.
   9. Name and Signature of Contractor.

D. The submittal transmittal data sheet will be provided by e-mail, if desired by the Contractor.

1.07 PRODUCT DATA

A. Contractor shall provide product data as required to supplement shop drawings.

B. Submittal Transmittal Data Sheet shall be provided for each product data submittal.

C. Product data shall include illustrations, schedules, installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.

D. Contractor shall mark each copy of the product data to identify products, models, options and other pertinent.

E. Submit five copies of each required submittal.

F. Contractor shall include all Material Safety Data Sheets (MSDS) required by OSHA.

1.08 SAMPLES

A. Contractor shall provide samples where noted or specified.

B. Submittal Transmittal Data Sheets shall be provided for each sample submittal.

C. Samples are physical examples which illustrate the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.

D. Samples shall have attached labels for identification bearing the following information:
   1. Project name.
   2. Description of sample.
   3. Contractor name.
   4. Standards met by the sample.
   5. Submit three samples for review.

E. Approval of the samples shall be obtained before proceeding with the work relating to the sample.

F. Samples not incorporated into the work, or otherwise designated as the Owner's property, are the property of the Contractor and shall be removed from the site.

G. Field samples shall comply with submittal requirements to the fullest extent possible.

1.09 QUALITY ASSURANCE SUBMITTALS

A. Submit quality-control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other sections of the specifications.

B. Submittal Transmittal Data Sheets shall be provided for each quality assurance submittal.

C. Inspection and Test Reports shall be submitted as required by other sections of the specifications.

1.10 OPERATION AND MAINTENANCE MANUALS

A. Contractor shall furnish operation and maintenance manuals in accordance with Section 01730, Operation and Maintenance Manuals.

1.11 INSTALLATION AND TRAINING CHECKLISTS

A. Contractor shall provide the Installation and Training checklists in accordance with Section 11000, Installation and Training Checklists.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

- END OF SECTION -

SUBMITTAL TRANSMITTAL DATA SHEET

(Attach to Each Submittal)

DATE: _____ PROJECT NAME: Puetz Road Booster Station

CONTRACTOR: _____ CONTRACT NO.: 4931-09-01

SUBMITTAL NO. _____ New Submittal ____ Resubmittal ____ Previous Submittal No. _____

SPECIFICATION SECTION NO. _____
(Cover only one section with each transmittal)

SUBMITTAL FOR: _____ Shop Drawings _____ Product Data _____ Samples

_____ O&M Information _____ Proposed Substitution _____ Other

Specifications Section	Number of Copies	Description ( )	Catalog Drawing or Brochure No.

I certify that the above submitted item has been reviewed in detail and is correct and in strict conformance with the contract drawings and specifications, except as otherwise stated, and is stamped accordingly.

_____
Signature of Contractor

SUBMITTAL REVIEW (**FOR ENGINEER'S USE ONLY**)

TO: _____ TARGET DATE: _____

REVIEWER INITIALS AND DATE: _____

COMMENTS _____

DISPOSITION:

1. No Exceptions Taken
2. Make Corrections Noted
3. Revise and Resubmit
4. Rejected
5. Submit Specified Item

Returned By: _____

Date: _____

SECTION 01323

CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.01 SUMMARY

A. Work included: This section includes photography of:
   1. Utility construction routes.
   2. Building sites.

B. Related Sections and Divisions:
   1. Applicable provisions of the General Conditions shall govern the work in this section.
   2. Section 01300, Submittals.

1.02 UTILITY ROUTES

A. Before construction may start in any section, the contractor shall deliver pre-construction photographs to the Engineer. The photographs shall be collated by project stationing. The photographs shall include:
   1. Intervals of 100-feet along pipeline route. (Indicate by station)
   2. Trees and shrubbery.
   3. Surfacing, sidewalks, driveways, and curb and gutter.
   4. Structures.
   5. Fencing, signs, and mail boxes.
   6. Culverts and topographic features.

1.03 BUILDING SITES

A. Building sites shall include wastewater treatment plants, water treatment plants, elevated tanks, bridges, and other structures.

B. Before construction may start, the Contractor shall provide pre-construction photographs to the Engineer. The photographs shall show building conditions and site features.

1.04 PHOTOGRAPHS

A. Photographs shall be in digital format, minimum 3.0 megapixels.

B. The digital footnote/file name shall include the date, name of work, direction of view, and location on each photo.

C. The Contractor shall provide two copies of each photo disc in .jpg format. The project name and project number shall be listed on each disc.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

- END OF SECTION -

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section includes providing temporary services. Temporary services and be included in total price of contract and maintained until final completion of project.

B. Related Sections and Divisions: Applicable provisions of the General Conditions shall govern the work in this section.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.01 TEMPORARY HEAT

A. Provide temporary heat required by construction activities for:
   1. Curing or drying of completed installations.
   2. Protection of installed construction from adverse affects of low temperatures or high humidity.
   3. Maintain a minimum temperature of 60°F in permanently enclosed portions of the building and areas where finished work has been installed.

B. Select safe equipment that will not have harmful effects on completed installations or elements being installed.

C. Coordinate ventilation requirements to produce ambient conditions required.

D. Except where use of the permanent system is authorized, provide vented, self-contained LP gas or fuel oil heaters with individual space thermostatic control.
   1. Use of gasoline-burning space heaters, open flame or salamander type heating units or any units that discharge products of combustion into the space being heated is prohibited.

E. When the permanent heating system is tested and ready for operation, it may be used on a temporary basis for heating and building until final acceptance:
   1. Contractor shall be responsible for cost of operation and fuel.
   2. The Owner will assume responsibility for operation and fuel costs on the date of final acceptance of the contract.
   3. Prior to final acceptance, clean entire unit and replace all filters.

3.02 TEMPORARY ELECTRICAL SERVICE

A. Provide a temporary, weatherproof, grounded electric service and distribution system of size and capacity needed for construction including:
   1. Meters.
   2. Transformers.
   3. Overload protected disconnects.
   4. Automatic ground-fault interrupters.
   5. Main distribution switchgear.

B. Permanent service may be used during construction when available.

C. Contractor shall be responsible for the costs of consumed power furnished through temporary or permanent service until final acceptance of project.

3.03 TEMPORARY WATER SERVICE

A. Provide temporary water service for construction operations.

B. If water service is available from the municipal water utility, the Contractor shall arrange for a temporary metered water service.
   1. Size of temporary service shall be minimum of 1 inch.
   2. Provide hose bibs as needed.
   3. Provide backflow protection as required by DCOMM plumbing code.

C. If water service is not available from a public utility, the Contractor shall be responsible for providing water from some other source.

D. The Contractor shall be responsible for costs of providing temporary service and water usage regardless of source.

3.04 SANITARY FACILITIES

A. Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation or combustion type, properly vented and fully enclosed with a fiberglass reinforced polyester shell or similar non-absorbent material.

B. Use of Owner's sanitary facilities is prohibited.

3.05 FIRST AID

A. Provide first aid equipment complying with governing regulations.

3.06 FIRE EXTINGUISHERS

A. Provide temporary fire extinguishers at project site until Owner occupation or final acceptance, whichever occurs first.

B. Provide hand-carried, portable UL rated, Class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable UL rated, Class "ABC" dry

chemical extinguishers, or a combination of extinguishers of NFPA recommended classed for the exposures.

C. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

3.07 REMOVAL OF TEMPORARY FACILITIES

A. Contractor shall remove temporary materials, equipment, services and construction as soon as practicable but not later than final completion.

B. Clean and repair damage caused by temporary facilities and restore to original condition.

C. Temporary facilities, which interfere with Owner's operation, shall be removed at the end of each work period.

- END OF SECTION -

SECTION 01563

EROSION CONTROL

PART 1 - GENERAL

1.01 SUMMARY

A. Work included: This section consists of construction and maintenance of temporary erosion and sediment control measures to be performed prior to and during construction.

B. Related Sections and Divisions:
   1. Applicable provisions of the General Conditions shall govern the work in this section.
   2. All related construction sections.
   3. Erosion Control and Storm Water Management Plan.
   4. Section 01300, Submittals.

C. Unless shown otherwise, the contractor shall be responsible for selecting method of erosion and sediment control.

D. The Contractor's erosion control measures must comply with the approved Erosion Control and Storm Water Management Plan, Wisconsin DNR Conservation Practice Standards, Latest Edition, WisDOT Product Acceptability List, Latest Edition, and local erosion control ordinances.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals:
   1. Material samples upon request or owner's representative.
   2. Manufacturer's certification that materials delivered comply with requirements of this section.

PART 2 - PRODUCTS

A. Products used for implementing the Erosion Control and Storm Water Management Plan and for conformance to WDNR Conservation Practice Standards, Latest Edition shall conform to the WisDOT Product Acceptability List, Latest Edition.

PART 3 - EXECUTION

A. All installations shall conform to requirements of the WDNR Conservation Practice Standards, Latest Edition.

B. The Contractor shall maintain a written record of all implemented erosion control practices as required by the WDNR. A suggested format is WDNR Form 3400-187, latest revision (see attached). The written record shall be maintained throughout final completion. Copies shall be forwarded to the Engineer upon request and with each pay request.

C. Inspections of implemented erosion and sediment control best management practices must be performed weekly and within 24 hours after a precipitation event 0.5 inches or greater which results in runoff.

D. Installed erosion control measures shall be removed from the site after 70% revegetation has been achieved, and all remaining disturbed areas shall be seeded, fertilized, and mulched.

PART 4 – PAYMENT

A. Payment shall be based on the following:
   1. Erosion Control shall be incidental to the lump sum.

- END OF SECTION –

Notice: Use of this specific form is voluntary, but the information contained on this form must be collected and kept by the permittee under s. NR 216.48(4), Wis. Adm. Code, for a construction site covered under the General WPDES Construction Site Storm Water Discharge Permit, Permit No. WI-0067831-2. This form is provided for the convenience of the permittee to meet the requirements of s. NR 216.48(4), Wis. Adm. Code. Multiple copies of this form may be made to compile the inspection report.

Inspections of implemented erosion and sediment control best management practices must be performed weekly and within 24 hours after a precipitation event 0.5 inches or greater which results in runoff.

Weekly written reports of all inspections conducted by or for the permittee must be maintained throughout the period of general permit coverage.

The information maintained in accordance with s. NR 216.48 (4) must be submitted to the Department upon request.

Name of Permittee:	
Construction Site Name (Project): **Puetz Road Booster Station**	**Construction Site ID No.: (WDNR #)**
Location:	**County:** **Milwaukee**
Contractor:	**Field Office Phone:**

Note: Weekly inspection reports, along with erosion control and storm water management plans, are required to be maintained on site and made available upon request.

Date of inspection (mm/dd/yy): ___ **Time of inspection:** **Start:** ___ **a.m./p.m.** **End:** ___ **a.m./p.m.**	**Type of inspection:** ☐ **Weekly** ☐ **Precipitation Event** ☐ **Other (specify)** _____ **Name(s) of individual(s) performing inspection:**
Weather:	
Description of present phase of construction:	

Modifications Required	Yes	No	Not Applicable	**Comments/Recommendations** about the overall effectiveness of the erosion and sediment control measures. **Note:** For each item checked "Yes", complete the follow-up information on page 2.
Ditch Checks	☐	☐	☐	
Erosion Control Plan	☐	☐	☐	
Erosion Mat	☐	☐	☐	
Grading Practices	☐	☐	☐	
Inlet Protection	☐	☐	☐	
Mulch	☐	☐	☐	
Offsite Sediment	☐	☐	☐	
Permanent Seeding	☐	☐	☐	
Schedule / Phasing	☐	☐	☐	
Silt Fence	☐	☐	☐	
Silt Screen	☐	☐	☐	
Sod	☐	☐	☐	
Stabilized Outlet	☐	☐	☐	
Temp. Diversion Channel	☐	☐	☐	
Temp. Settling Basin	☐	☐	☐	
Temporary Seeding	☐	☐	☐	
Tracking Pads	☐	☐	☐	
Turbidity Barrier	☐	☐	☐	
Other (specify) ___	☐	☐	☐	

Use the space below for detailed follow-up action items.

Exact place of erosion/sediment control inspected	Type of erosion/sediment control and its observed condition	Description of any necessary maintenance or repair to erosion/sediment control, including anticipated date of completion

Name of Permittee:		
Construction Site Name (Project): Puetz Road Booster Station		Construction Site ID No.: (WDNR #)

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.

B. Related Sections and Divisions:
   1. Applicable provisions of the General Conditions shall govern the work in this section.
   2. Section 01300, Submittals.

1.02 MATERIALS - QUALITY ASSURANCE

A. It is the intent of these specifications to procure a quality product by an established manufacturer of the latest design. All components of systems shall be engineered for long, continuous, uninterrupted service. The cost of the equipment shall include all royalties and costs arising from patents and licenses associated with furnishing the specified equipment.

B. All materials shall be designed to withstand stresses encountered in continuous operation, fabrication and erection. All equipment shall be of corrosion-resistant materials or shall be suitably protected by the supplier with corrosion-resistant industrial coatings. Provisions shall be made for ease of lubrication, adjustment and replacement of parts.

C. Material for which no detailed specifications are given shall:
   1. Meet the particular industry standard for the material used.
   2. Meet the specifications of ASTM, ANSI or SAE for metals and plastics for the use intended.
   3. Not be used unless it has previously been used for a like purpose for a sufficient length of time in the field or under field-simulated laboratory conditions to demonstrate its successful use.

D. Source Limitations
   To the fullest extent possible, provide products of the same kind from a single source.
   1. When specified products are available only from sources that do not, or cannot, produce a quantity adequate to complete project requirements in a timely manner, consult with the Engineer/Architect to determine the most important product qualities to consider before proceeding. Qualities may include attributes, such as visual appearance, strength, durability, or compatibility. When a determination has been made, select products from sources producing products that possess these qualities, to the fullest extent possible.

E. Compatibility of Options
   When the Contractor is given the option of selecting between 2 or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.03 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Provide equipment and personnel to handle products by methods that avoid soiling or damage.
4. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
5. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that quantities are correct, products are undamaged, and properly protected. Inform the Engineer or Owner before the inspection occurs, so that they may participate in the inspection if so desired.
6. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units. Seals and labels shall be intact and legible.
7. Store products in accordance with manufacturer's instructions. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
8. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.
9. Arrange for fabricated items or products stored outside to be placed on sloped supports above the ground. Items subject to deterioration shall be covered by weather proof sheet covering which is ventilated to prevent condensation.
10. Store loose granular materials on solid surfaces which are well drained and prevent contamination by foreign matter.
11. Arrange for periodic inspection of stored materials to insure that materials remain undamaged and are maintained under required conditions.
12. All shipment, delivery and storage charges shall be at the expense of the contractor.

1.04 MAINTENANCE OF STORAGE

A. Contractor shall periodically inspect stored products on a scheduled basis.

B. Contractor shall verify that storage facilities comply with manufacturer's product storage requirements, and verify that manufacturer required environmental conditions are maintained continually.

C. Contractor shall verify that surfaces of products exposed to the elements are not adversely affected and that any weathering of finishes is acceptable under requirements of Contract Documents.

D. Contractor shall perform scheduled maintenance of equipment in storage as recommended by the manufacturer. A record of the maintenance shall be kept and turned over to Engineer when the equipment is installed.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.01 INSTALLATION OF PRODUCTS

A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
   1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

3.02 INSTALLATION REQUIREMENTS

A. Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditions as directed by the respective manufacturers, unless otherwise specified.

B. After installation, Contractor shall protect all materials and equipment against weather, dust, moisture, and mechanical damage.

C. Contractor shall be responsible for all damages that occur in connection with the care and protection of all materials and equipment until completion and final acceptance of the work by Owner. Damaged material and equipment shall be immediately removed form the site.

3.03 FIELD QUALITY CONTROL

A. Qualifications of Manufacturers Field Personnel
   1. Personnel shall be authorized by the manufacturer to erect start-up and initiate warranty of the equipment provided.
   2. Personnel shall come to the site with the required tools and electrical instruments.
   3. Personnel shall have full knowledge of electrical controls pertaining to the equipment and control panels furnished.
   4. Failure to provide personnel with full qualifications shall be cause for service trip to be disqualified as part of the requirements and may because for reimbursement for costs incurred by the Owner due to services required for a qualified start-up inspection.

- END OF SECTION -

SECTION 01650

STARTUP, TESTING AND OPERATOR TRAINING

PART 1 - GENERAL

1.01 SUMMARY

A. Work included: This section includes the procedures for checking, starting, and field testing of equipment and operator training after installation. The installation, startup, and testing tasks for a system shall be completed and approved by the Engineer before any operator training can be performed on that system.

B. Related sections and division
   1. Applicable provisions of the general conditions shall govern the work in this section.
   2. Section 01300, Submittals.
   3. Section 11000, Equipment Installation, Startup, Testing and Training Checklists and Certifications and Receipt of Spare Parts
   4. Individual equipment specifications.

1.02 DEFINITIONS

A. System: A system means the overall process, or a portion thereof, that performs a specific function. A system may consist of two or more subsystems as well as two or more types of equipment.

B. Subsystem: A subsystem is a portion of a larger system.

C. Functional Acceptance Test (FAT): Tests necessary to demonstrate that installed equipment and systems function as specified and operate in the manner intended.

D. Startup: The process of placing a system in operation, including evaluation and verification of the operating characteristics of the system.

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals:
   1. Installation checklist and certification in accordance with Section 11000 before start up testing is begun.
   2. Installation completion schedule.
   3. Functional Acceptance Test plan and test forms for each equipment item, subsystem, and system.
   4. Schedule for startup submitted a minimum of 14 days in advance of proposed start of startup testing.
   5. Approvable operation and maintenance manuals for each equipment item and system to be tested a minimum of 14 days before scheduled start up.
   6. Qualification and experience records of proposed manufacturer's representatives who will assist with equipment testing and with training sessions.
   7. Start-up period operation records.
   8. Start-up and training checklists and certifications in accordance with Section 11000.

1.04 INSTALLATION CHECK AND INITIAL TESTING

A. Contractor's Responsibilities: The Contractor shall:

1. Provide services of manufacturer's representatives of products and systems for checking, testing, and startup specified for each equipment item. Manufacturer's representatives shall be authorized by the manufacturer to perform start-up and initiate warranty of equipment provided. Personnel shall come to the job site with all the required tools and testing instruments required for their work and shall have full knowledge of electrical controls pertaining to equipment and control panels.
2. Resolve assembly or installation problems attributable to, or associated with, the products and systems, whether or not specifically required in the Specifications.
3. Clean up equipment and surrounding areas.
4. Provide safe access to the work area to facilitate initial testing and any training activities.
5. Confirm presence of any gauges, valves or other appurtenances required for proper operation and testing of the equipment.
6. Check for proper rotation, alignment, speed, excessive vibration, and quiet operation.
7. Promptly correct all defects noted during installation check at Contractor's expense.
8. Perform initial equipment and system adjustment and calibrations with the assistance of manufacturer's representative. Conduct Functional Acceptance Testing as required to demonstrate suitability of equipment for startup and performance testing.
9. Submit installation checklist and certification in accordance with Section 11000. Submittal of the installation checklist, certifications, and functional acceptance testing is a prerequisite for startup and performance testing.

1.05 STARTUP AND PERFORMANCE TESTING

A. Contractor's Responsibilities: The Contractor shall:

1. Prepare startup and testing schedule and incorporate startup and testing activities in the progress schedule for the work, in accordance with Section 01300 Submittals.
2. Notify Engineer and respective equipment manufacturers at least 21 calendar days prior to the date when each equipment system is scheduled to be initially started; also submit testing plan stating schedule, quantity and source of utilities, chemicals, and other materials needed.
3. Provide labor, materials, tools, instruments, and services for checking, start-up, and testing specified for each equipment item, except for items specified to be furnished by Owner. Instruments that may be required include, but are not limited to, flow meters and gauges for monitoring of performance, even if not otherwise specified.
4. Provide services of manufacturers' representatives, subcontractors, electricians, instrumentation technicians, and pipe fitters. Designate one person (other than field superintendent) to be responsible for coordinating and expediting startup and testing responsibilities, and to be present during all pre-startup meetings and available to Owner's personnel during the startup and performance testing.
5. Develop a standard testing log to be used as a record of testing of each equipment item and subsystem. This log shall:
   a. Be subject to approval of Engineer,
   b. Include equipment name and associated subsystems,
   c. Have provisions for recording dates of completion for installation checking, inspection by manufacturer, verification of instrumentation and controls, and completion of subsystem tests, and
   d. Provide space for any remaining problems with equipment and for signatures of Contractor and manufacturer's representative and Engineer indicating acceptance.
6. Furnish any spare parts and special tools specified for the respective equipment.

7. Furnish O & M information needed for O & M Manual, as specified in Section 01300, Submittals.
8. Complete startup of all subsystems that may be associated with the system including but not limited to plumbing, electrical, instrumentation, and HVAC systems.
9. Provide safe access to the work area to facilitate startup and training activities.
10. Submit startup and performance testing checklist and certification in accordance with Section 11000. Submittal and approval of the startup and performance checklist and certification is a prerequisite for acceptance of the system for substantial completion.

B. Owner's Responsibilities: The Owner will:
1. Furnish for Contractor's use during startup and testing:
   a. Electrical power
   b. Potable water
   c. Non-potable water.
   d. Process water.
2. Provide sampling labor, materials, and laboratory analysis.
3. Furnish Owner's representative to witness all tests.

C. Startup Completion
1. Startup of any portion is considered complete when, in the opinion of the Engineer, the system or designated subsystem has operated properly for seven continuous days without failure. The 7-day startup period is in addition to specified testing and training.
2. Successful startup of all systems shall be accomplished prior to determination of substantial completion as defined in the General Conditions.
3. Failure during startup shall include any of the following events:
   a. Failure of Contractor to maintain 24-hour alarm response personnel during startup period.
   b. Failure to meet specified performance requirements for more than four consecutive hours.
   c. Failure of a system that is not permanently corrected within 4 hours after such failure occurs.
4. "Permanently corrected" shall consist of all the following:
   a. Work repaired and replaced to conform to specified requirements.
   b. Parts and components replaced as recommended by original manufacturer and conforming to reviewed submittals.
   c. Piping and valves properly installed and connected.
   d. Wiring properly terminated and enclosed in raceways.
   e. Accessories, including spare parts and lubricants, furnished as specified.
5. Any failure shall halt the startup then in progress. Startup shall be restarted from the beginning after permanent corrections are made.

D. Operation Period: The operation period begins when the facility has been substantially completed as defined in the General Conditions.

1.06 TRAINING OF OWNER'S PERSONNEL

A. Installation Completion Schedule: Required for scheduling the training of Owner's operating personnel by equipment manufacturers.
1. List estimated completion dates for the equipment and systems requiring services of manufacturers' representatives.

2. Submit the installation completion date for each equipment item or system not less than 21 calendar days prior to the time that associated equipment is installed and is in a suitable condition for training the Owner's personnel.
3. Revise the schedule to facilitate training of appropriate personnel, as deemed necessary by Owner, and to ensure full participation by manufacturers' representatives.

B. Contractor's Personnel: Designate and provide Contractor's personnel to be responsible for coordinating and expediting training duties. The person(s) shall be present during training coordination meetings with the Owner and shall be familiar with the Operation and Maintenance (O&M) Manual information.

C. Manufacturer's Representative: Contractor shall furnish manufacturer's representative(s) to provide detailed instructions to Owner's personnel for operation and maintenance of the specified equipment.
1. Training services include shall include classroom instructions and onsite, hands-on instruction on the equipment as stated in the Specifications.
2. Manufacturer's representative shall be familiar with O&M requirements as well as with the specified equipment and associated subsystems.

D. Training Sessions: The Contractor shall provide Manufacturer's representative to conduct training sessions for each system.
1. Initial classroom training shall include review of descriptive material and the O& M Manual. Review shall include but not be limited to routine and emergency operation of the equipment, instrumentation and controls and safety. Classroom training is a prerequisite for field training on the equipment.
2. Field training shall be conducted on the equipment following successful startup. Filed training shall include but not be limited to hands-on operation of all controls and functions of the equipment and review of all maintenance and safety procedures.
3. A classroom review session shall be held following completion of the field training to review the training and provide a forum for questions.
4. The Owner reserves the right to videotape all training sessions, including manufacturer representatives' hands-on equipment instruction.
5. Access to the Work Area: The Contractor shall provide safe access to the work area to facilitate training.

PART 2 -- PRODUCTS

NOT APPLICABLE

PART 3 -- EXECUTION

3.01 PREPARATION FOR STARTUP AND PERFORMANCE TESTING

A. Startup Preparation: Equipment shall be determined ready for startup based on the following:
1. Notification by Contractor of readiness of equipment and systems for startup.
2. Submittal of startup plan stating detailed procedures including quantity and source of utilities, chemicals, and other materials needed for each test.
3. Submittal and acceptance of O & M Manuals incorporating review comments.
4. Submittal of manufacturer's checklist and certification of proper installation.
5. Submittal of completed functional acceptance test forms.
6. Cleanliness of equipment, devices, connected work, and areas around the equipment.
7. Completion of startup for any associated subsystems.

8. Availability and acceptability of manufacturer's representative to assist testing of respective equipment and satisfactory fulfillment of other specified manufacturers' responsibilities.
9. Pre-testing Meeting: Contractor shall arrange a meeting with the Owner and Engineer to review the Contractor's detailed testing plan for each equipment item and system, at least 2 days prior to the first test run.

B. Prior to Initial Testing of equipment:
1. Inspect and clean equipment, devices, tanks, connected piping, and the surrounding area so they are free of foreign material.
2. Provide safe access for Owner personnel to the system for observation of startup activities.
3. Lubricate equipment in accordance with manufacturer's instructions.
4. Turn rotating equipment by hand and check motor-driven equipment for correct rotation.
5. Open and close valves by hand and operate other devices to check for binding, interference, or improper functioning.
6. Check power supply to electric-powered equipment for correct voltage.
7. Obtain manufacturer's certification of proper installation, where specified.
8. Owner shall operate existing systems that have undergone successful startup.

3.02 FUNCTIONAL TESTING

A. Subsystem Tests: Startup and operate the individual components and subsystems that make up each equipment system. Functional testing of a complete system shall not begin until subsystem testing is completed to the Engineer's satisfaction.

B. Equipment and System Tests: Contractors shall functionally test each separate piece of equipment, and each system requiring simultaneous operation of interdependent equipment, in accordance with the following procedures:
1. Separate items of equipment demonstrated to function properly during subsystem testing shall require no further functional testing, if documentation of subsystem testing is accepted by Engineer.
2. Functional testing of each system shall begin after subsystems and equipment units have been satisfactorily tested.
3. Functional testing will begin at a time mutually agreed upon by the Engineer, Owner, manufacturer's representative(s), and Contractor.
   a. The Owner or Engineer may be present during tests.
   b. Notify Engineer, Owner, and manufacturer's representative at least 14 days prior to scheduled date of tests.
4. Conduct functional testing until every equipment item in each system has demonstrated satisfactory operation. Demonstrate all operational features and controls while system and equipment operate in automatic modes.
5. Startup testing of a system shall not be allowed until the initial testing of the complete system, including all subsystems in which the system operates, have been completed and documented in accordance with Section 11000.
6. If the Engineer accepts the installation and startup checklists and certifications, including functional testing of a system, the system may be scheduled for startup testing. If the Engineer determines that the functional tests do not meet the specifications, the system will be considered nonconforming.

3.03 PERFORMANCE TESTING

A. Performance testing shall use plant fluid or material that the equipment or system is designed to handle curing normal service conditions, unless otherwise specified.

B. Equipment and Subsystem Tests: Contractor shall:

1. Clean and check equipment and devices, as specified under Article TESTING PREPARATION, prior to starting equipment and subsystem performance tests.
2. Performance testing will begin at a time mutually agreed upon by the Engineer, manufacturer's representative(s), and Contractor.
   a. The Engineer will be present during tests.
   b. Notify Engineer, Owner, and manufacturer's representative at least 14 days prior to scheduled date of performance testing and confirm the date 5 days prior to testing.
3. Obtain supplies and materials, including water and chemicals; provide sufficient advance notice for suppliers.
4. Operate the necessary equipment units as specified in the respective O & M Manuals for a continuous period of 24 hours.
5. Follow Engineer-approved testing plan and detailed procedures specified for each equipment unit and subsystem including sample collection and analysis if required.
6. Complete acceptable performance testing of all equipment and subsystems included in a system, and submit test documentation, before starting the system performance test.

END OF SECTION

SECTION 01661

TESTING AND INSPECTION OF PIPELINE CONSTRUCTION

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section specifies various types of tests and inspection procedures to be used on installed pipelines for determining water and pressure tightness and alignment.

B. Related Sections and Divisions:
1. Applicable provisions of the General Conditions shall apply to this section.
2. Section 01300, Submittals
3. Section 02565, Forcemain
4. Section 02616, Ductile Iron Pipe
5. Section 02617, Steel Pipe
6. Section 02618, Stainless Steel Pipe and Fittings
7. Section 02622, PVC Plastic Pipe
8. Section 02623, Polyethylene Pipe
9. Section 02624, PVC Lined R.C.P Sewer
10. Section 02625, Centrifugally Cast Fiberglass Mortar Pipe
11. Section 02626, Corrugated High Density Polyethylene Pipe
12. Section 02660, Watermain
13. Section 02730, Sanitary Sewer
14. Section 02780, High Density Polyethylene Pipe
15. Section 13325, Double-Walled Leachate Transfer Line
16. Section 15050, Methods and Materials for Piping Installation

1.02 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1.	ASTM C828	Low Pressure Air Test of Vitrified Clay Pipe Lines (4 to 12 in.).
2.	ASTM D3034	Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
3.	ASTM F679S	Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
4.	ASTM D3350-84	Polyethylene Plastic Pipe and Fittings Material

B. American Water Works Association (AWWA):

1.	AWWA C651	Disinfecting Watermains

C. American National Standards Institute (ANSI):

1.	ANSI B16.5-81	Pipe Flanges (150 lb.)

D. American Water Works Association (AWWA):

1.	AWWA C207-86	Standard for Steel Pipe Flanges for Waterworks Service – Size 4 inches through 144 inches

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.01 PREPARATION OF PIPELINE BEFORE TESTING

A. The pipes shall be clean of debris and materials prior to testing.

B. Televising shall be performed immediately after cleaning.

3.02 STANDARD GRAVITY PIPELINE INFILTRATION TEST

A. Measurement of infiltrating flow utilizing weir or a dam with measuring container at downstream end of pipeline sector being tested.

B. Conditions to Prevail Before Infiltration Test Commences
   1. Groundwater level shall produce a minimum positive head of 2 feet over all sections of pipeline being tested.
   2. Groundwater level shall be measured by the Contractor prior to the infiltration test utilizing a measurement method acceptable to Engineer.
   3. Weir or dam shall be in place 12 hours before measurement of flow.
   4. Any source of water, sewage or other liquid except infiltrating groundwater shall be eliminated before conducting test.

C. Maximum Limits of Infiltration
   1. Infiltration shall be limited to the maximum allowed as specified in the section for Materials and Methods of Construction for the pipeline specified.
   2. When infiltration limits for gravity pipelines are not given in the appropriate section for Materials and Methods of Construction, the following limits shall apply:
      a. Two hundred gallons in 24 hours for each inch of the diameter of pipe being tested, for every one mile of pipe.
      b. Infiltration rate for manholes shall be computed using the total number of vertical feet of manhole expressed as the equivalent largest diameter sewer entering the manhole.

D. Equipment and Personnel to be supplied by the Engineer
   1. Measuring weirs.
      a. "V" notch 30°, 60°, or 90° with end contractions.
      b. Sharp crested with edge ground to 45°.
      c. Install in manhole or pipe in such a manner that leakage is zero.
      d. Discharge for "V" notch weirs shall be based on the following formula:
         When:
         Q = Cu. ft. per second
         C =.57
         L = Width of notch in ft. at H distance above the apex.
         H = Head of liquid above the apex of notch in feet.
         g = 32.174

e. End contractions shall not be less than 3/4 L.

2. Shallow measuring vessel calibrated to gallons and tenths of gallons.
3. Stop watch with sweep hand indicating seconds and tenths of seconds (certified accurate by a state licensed watchmaker).
4. Sufficient personnel to conduct tests.
5. Either weir method or stopwatch and container method may be used at discretion of Engineer.

E. Equipment and Personnel to be provided by Contract.

1. Qualified observer.
2. Personnel to assist in placing and removing weirs.
3. Contractor responsible for safety during tests including:
   a. Providing signs.
   b. Providing safety equipment including safety equipment for confined entry.
   c. Providing signalmen when necessary.

3.03 STANDARD GRAVITY PIPELINE EXFILTRATION TEST

A. The Contractor may perform an exfiltration test when groundwater level is less than 2 feet above sections of pipeline being tested.

B. The following shall be completed prior to testing:

1. Pipeline shall be tested with a minimum positive head of 2 feet in all sections.
2. Pipeline and manholes shall be filled with water until the water level is a minimum of 2 feet above the highest section of pipe or a minimum of 2 feet above the groundwater level, whichever elevation is higher.
3. Groundwater level shall be measured by the Contractor prior to the infiltration test utilizing a measurement method acceptable to Engineer.

C. The following is the recommended test procedure:

1. Plug section to be tested.
2. Laterals on the line being tested shall be provided with a temporary cleanout to permit adequate release of trapped air in laterals.
3. Fill line and manhole with water as per paragraph B.
4. Let line stand for 12 hours adding water periodically to retain test level as it is reaching its maximum absorption and entrapped air is escaping.
5. After 12 hours, refill line to test level and let stand for 1-hour test period.
6. Measure and record loss of water in gallons per hour.
7. Subtract manhole loss as previously determined, to get actual line loss.
8. Repair and retest until results of final test hour are within allowable leakage limits.

D. Exfiltration shall be limited to 8.34 gallons per hour per inch diameter per mile of pipe.

3.04 STANDARD PRESSURE AND LEAKAGE TEST FOR PRESSURIZED PIPELINES

A. Measure drop in pressure and leakage from liquid filled and pressurized pipelines.

B. Conditions to prevail before commencement of test.

1. Disinfect all testing equipment and fittings.
2. Backfill to at least minimum 4 feet compacted backfill material.

3. Length of pipeline tested shall not exceed 2,000 feet.
4. Reaction backing to be in place a minimum of;
    a. Thirty-six hours if concrete thrust backing has been cast with high early cement.
    b. Seven days if concrete thrust blocking has been cast with standard cement.
5. Fill with water.
    a. Fill each valved section with water slowly, expelling air completely from the pipeline, valves, and hydrants.
    b. Where permanent air vents are not located at all high points or dead ends, Contractor shall install corporation cocks at such points so that air can be expelled as the line is filled with water.
        1) Close all these corporation cocks before applying pressure or leakage tests.
        2) At the conclusion of the leakage and pressure test, the corporation cocks shall be removed and plugged, or left in at the discretion of the Owner.
6. Pressurize to normal working pressure.
    a. After test connections are made and pipeline is filled with water, the pipeline shall be subjected to water pressure normal for that segment of the system being tested.
    b. Examine system for any visible leakage at this stage.
        1) Repair any visible leaks.
        2) Re-pressurize to normal working pressure and continue to repair and re-pressurize until all visible leaks have been stopped.

C. Pressure Test
1. Test pressure shall be not less than 150 lbs. per sq. inch at the lowest point of elevation of the segment being tested.
    a. The minimum test pressures specified above may require that the installed system be tested in several segments in order to attain the proper pressure.
    b. If test pressures other than indicated above are called for in the sections for Materials and Methods of Construction, those pressures shall be used.
2. Pressurize the system being tested to pressure required above by adding water with high-pressure test pump.
3. Repair any visible leaks occurring due to test pressure application.
4. Repeat pressurizing of system to test pressure until no visible leaks can be found.
5. Duration of pressure test.
    a. Test period shall be two continuous hours with no visible leaks occurring.
    b. Pressure during test period shall be sustained.
6. Contractor shall provide pressure gauge with 4-inch face and snubber. Pressure shall read in one-pound increments.
7. If it is found unnecessary to add water during the duration of the pressure test, the leakage test may be waived with the approval of the Engineer.

D. Leakage Test
1. Leakage test shall be conducted after completion of the pressure test.
2. At the option of the Contractor, pressure and leakage tests may be run concurrently.
    a. This option must have the approval of the Engineer.
    b. If this option is agreed upon, then the test procedures required for pressure tests shall prevail for both pressure and leakage tests.
3. When leakage test is conducted after satisfactory completion of the pressure test, the test section shall be subjected to 100 pounds per square inch gauge pressure at the lowest elevation of the section of the main being tested.
    a. If leakage test pressures other than indicated above are called for in the sections for Materials and Methods of Construction, those pressures shall be used.

4. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved section of it, necessary to maintain the specified leakage test pressure after the main has been filled with water and the air expelled.
   a. Pressure during test period shall be sustained within plus or minus 5 lbs. of the required test pressure by adding water with test pump.
   b. Meter the amount of water added.
5. Leakage shall not exceed the number of gallons per hour as determined by the following formula:

$$L = \frac{SD\sqrt{P}}{133{,}200}$$

When:
L = Allowable Leakage in Gallons/Hr.
S =Total Length of Pipe Tested in Feet
D =Nominal Pipe Dia. in Inches
P = Average Test Pressure in lbs/sq. in.

6. When the section under test contains various diameters of pipe, the available leakage will be the sum of the computed leakage for each size of pipe.
7. Should any test section fail to meet the leakage test, the Contractor shall immediately make the necessary repairs at his own expense.
8. Duration of final leakage test shall be one continuous hour with leakage within the allowable limits during the test hour.

E. Contractor shall provide all equipment required to perform the test.

3.05 LOW PRESSURE AIR TEST

A. Contractor shall perform a low-pressure air test on gravity pipelines in lieu of infiltration or exfiltration tests when pipeline is not submerged in groundwater. Test shall conform to ASTM C828.

B. Contractor shall provide all equipment required to perform the test.

C. Testing Procedure
1. Determine test time as follows:
   a. Test times for pipeline segments with uniform pipe size shall be taken from test timetable list below.
   b. Test times for pipeline segments longer than those shown and/or of non-uniform pipe size shall be calculated utilizing appropriate formulas in ASTM C828.

Test Timetable

PIPE DIAMETER "D" IN INCHES

	8	10	12	15	18	21	24	27	30	36	42
25	0.30	0.37	0.45	0.52	0.60	0.74	0.89	1.04	1.19	1.50	1.82
50	0.59	0.74	0.89	1.04	1.20	1.49	1.78	2.08	2.39	3.01	3.64
75	0.89	1.11	1.34	1.57	1.80	2.23	2.67	3.12	3.58	4.51	5.45
100	1.19	1.48	1.78	2.09	2.40	2.97	3.56	4.16	4.77	6.01	7.27
125	1.48	1.86	2.23	2.61	3.01	3.72	4.45	5.20	5.96	7.51	9.09
150	1.78	2.23	2.67	3.13	3.61	4.46	5.34	6.24	7.16	9.02	10.91
175	2.08	2.60	3.12	3.65	4.21	5.21	6.23	7.28	8.35	10.52	12.73
200	2.37	2.97	3.56	4.17	4.81	5.95	7.12	8.32	9.54	12.02	14.54

	8	10	12	15	18	21	24	27	30	36	42
225	2.67	3.34	4.01	4.70	5.41	6.69	8.01	9.36	10.73	13.52	16.36
250	2.97	3.71	4.45	5.22	6.01	7.44	8.90	10.40	11.93	15.03	18.18
275	3.26	4.08	4.90	5.74	6.61	8.18	9.79	11.44	13.12	16.53	20.00
300	3.56	4.45	5.34	6.26	7.21	8.92	10.68	12.48	14.31	18.03	21.81
325	3.86	4.82	5.79	6.78	7.81	9.67	11.58	13.52	15.50	19.53	23.63
350	4.16	5.19	6.23	7.30	8.41	10.41	12.47	14.56	16.70	21.04	25.45
375	4.45	5.57	6.68	7.83	9.02	11.16	13.36	15.60	17.89	22.54	27.27
400	4.75	5.94	7.12	8.35	9.62	11.90	14.25	16.64	19.08	24.04	29.09
425	5.05	6.31	7.57	8.87	10.22	12.64	15.14	17.68	20.27	25.54	30.90
450	5.34	6.68	8.01	9.39	10.82	13.39	16.03	18.72	21.47	27.05	32.72
475	5.64	7.05	8.46	9.91	11.42	14.13	16.92	19.76	22.66	28.55	34.54
500	5.94	7.42	8.90	10.43	12.02	14.87	17.81	20.80	23.85	30.05	36.36
525	6.23	7.79	9.35	10.96	12.62	15.62	18.70	21.84	25.04	31.55	38.18
550	6.53	8.16	9.79	11.48	13.22	16.36	19.59	22.88	26.24	33.06	39.99
575	6.83	8.53	10.24	12.00	13.82	17.10	20.48	23.93	27.43	34.56	41.81
600	7.12	8.90	10.68	12.52	14.42	17.85	21.37	24.97	28.62	36.06	43.63

c. Specified test time (minutes) required for pressure drop from 3-1/2 to 2-1/2 psi when testing one pipe diameter only.

d. Interpolate test times for segment lengths not specifically listed.

2. Pressurize pipeline to 4.0 psi and allow to stabilize (stabilization of air temperature may cause pressure drop).

3. When pressure has stabilized, start test at 3.5 psi and record time.

4. If pressure drops more than 1.0 psi during the determined test time, the test will be considered failed.

3.06 TELEVISING OF PIPELINES

A. Televising of pipelines shall be in accordance with Section 02608, Sewer Cleaning and Televising.

3.07 DEFLECTION TEST

A. Perform deflection tests on all PVC and HDPE gravity pipelines.

B. Not less than 30 days after the installation and backfilling of sewers, including any service connections, the Contractor shall, in the presence of the Engineer, test deflection of the pipe with a mandrel (GO-NOGO device). The mandrel shall be hand-pulled. All pipe with deflections in excess of 5% of the base internal diameter, as determined by ASTM D 3034, ASTM F 679, or ASTM F 794, shall be excavated, rerounded, backfilled and retested after an additional period of at least 30 days. Mandrels shall have nine ribs and be only hand-pulled through the test section. The Contractor shall furnish the mandrels. The length of the minimum radius portion of the mandrel shall not be less than one-third of the nominal diameter of the pipe tested. The pipe shall be flushed and cleaned by the Contractor prior to testing. No flow will be permitted in the pipe while testing for deflections.

1. All expense for trenching, backfill, compaction, paving, and related work that is required because of failure to meet deflection test requirements shall be borne by the Contractor.

2. Acceptance of plastic pipe sewers shall be made only after these deflection test requirements have been met.

C. Mandrel sizes shall be in accordance to the following:

1. PVC SDR 35 (ASTM D3034)

Pipe Size (Inches)	Mandrel Size (Inches)
8	7.28
10	9.08
12	10.79
15	13.20

2. PVC (ASTM F679)

Pipe Size (Inches)	Wall Thickness	Mandrel Size (Inches)
18	T-IA	16.13
18	T-2B	16.20
21	T-IA	19.00
21	T-2B	19.09
24	T-IA	21.36
24	T-2B	21.46
27	T-IA	24.06
27	T-2B	24.17

3. N-12 (5% Deflection)

Pipe Size (Inches)	Mandrel Size (Inches)
8	7.39
10	9.26
12	11.23
15	14.02
18	16.84
24	22.46
30	28.07
36	33.69
42	38.83
48	44.50

3.08 REPLACEMENT AND REPAIRS

A. The Contractor shall replace or repair any section of pipeline found to be defective so that the pipeline meets the requirements of the specification.

3.09 DISINFECTION

A. The following shall be disinfected in accordance with AWWA C651:
1. New watermain construction.
2. Existing watermain when cut into or repaired.

B. The lines shall be disinfected and flushed until the system is safe.

C. At least one sample shall be collected from every 1,200 feet of watermain, plus one set of samples from the end of each main and a minimum of one from each new branch.

D. The Contractor shall provide the Owner with two copies of lab test results certifying that the water sampled is free of contamination tests shall be done prior to standard pressure and leakage test for pressurized pipelines and after completion of pressure and leakage test.

3.10 TRACER WIRE TESTING

A. Contractor shall test all tracer wire.

B. A power source shall be provided which will transmit a measurable amount of DC current the length of the tracer wire or length of the test area. Current readings shall be taken with the test current "off', then "on" to differentiate between test current and stray current.

C. If continuity is not achieved, the Contractor shall perform required repairs and repeat the test.

3.11 BASIS OF PAYMENT

A. Testing of pipe segments in considered to be incidental to the work and payment for testing the piping segments is included in the cost to provide and install the pipe.

– END OF SECTION –

ATTACHMENT TO FORM

EXAMPLE CALCULATION SHEET

GIVEN: P_i = 10 psig
T_i = 21.1 °C = 70°F

and at time t = 60 minutes

P_t = 10.05 psig
T_t = 23.0 °C = 73°F

Calculate Corrected Initial Pressure

$$P_c = \frac{(10.0 + 14.7)(23.0 + 273)}{(21.1 + 273)} - 14.7$$

P_c = 24.85 - 14.7 = 10.15 psig

Calculate Percent Pressure Loss

$$\% \text{ Pressure Loss} = \frac{10.15 - 10.05}{10.15} \times 100 = 0.98\% < 1\% \text{ ok}$$

Note: The difference between the corrected pressure reading (P_c) and the gauge reading (P_t) cannot differ by more than 1% of the corrected pressure reading (P_c) (i.e., .105 @ 10.5 psig) over a time interval of 60 minutes.

SANITARY SEWER LOW PRESSURE AIR TEST

PROJECT: Puetz Road Booster Station

CONTRACTOR:

LOCATION:

DATE:

Test Location

MH # To MH #

Length of Main Size of Main

Length of Lateral Size of Lateral

Length of Main

Length of Lateral

Type of Pipe

Req'd Holding Time

Start Pressure

End Pressure

Test: Pass Fail

No Go

Witnessed By

Test Location

MH # To MH #

Length of Main Size of Main

Length of Lateral Size of Lateral

Length of Main

Length of Lateral

Type of Pipe

Req'd Holding Time

Start Pressure

End Pressure

Test: Pass Fail

No Go

Witnessed By

Test Location

MH # To MH #

Length of Main Size of Main

Length of Lateral Size of Lateral

Length of Main

Length of Lateral

Type of Pipe

Req'd Holding Time

Start Pressure

End Pressure

Test: Pass Fail

No Go

Witnessed By

Test Location

MH # To MH #

Length of Main Size of Main

Length of Lateral Size of Lateral

Length of Main

Length of Lateral

Type of Pipe

Req'd Holding Time

Start Pressure

End Pressure

Test: Pass Fail

No Go

Witnessed By

HYDROSTATIC TEST REPORT

Project: Puetz Road Booster Station Contract: 4931-09-01

Location of Watermain: _____

Date of Test: _____ Tested By: _____

TEST SECTION:

Size (in.)	No. of Joints	Elevation		Allowable Leakage[a] (GPH)
		High	Low	
			Total	

Type of Pipe and Joints: _____

Average Length of Pipe Sections: _____ ft. Total Length: _____ ft.

Pressure applied at:[b] _____

PRESSURE TEST:

Initial Test Pressure: _____ psi Duration of Pressure Test: _____ hrs

Final Test Pressure: _____ psi Pressure Drop During Test: _____ psi

Remarks:[c] _____

_____

LEAKAGE TEST:

Pressure During Test: _____ psi Duration of Leakage Test _____ hrs

Allowable Leakage of Test Section _____ GPH (Total from above)

Actual Leakage _____ GPH

Percent of Allowable _____

Leakage shall not exceed the number of gallons per hour as determined by the following formula:

$$L = \frac{SD\sqrt{P}}{133{,}200}$$

When:

L = Allowable Leakage in Gallons/Hr.

S =Total Length of Pipe Tested in Feet

D =Nominal Pipe Dia. in Inches

P = Average Test Pressure in lbs/sq. in.

b. Describe location and elevation of point of application of pressure

c. Include results of inspection of the test section and description of repair of any defects

COMMENTS: PASS _____ FAIL _____

_____

_____

SECTION 01730

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section includes providing operation and maintenance data in accordance with this section and the individual equipment specifications.

B. Related Sections and Divisions:
1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Section 01770, Closeout Procedures
4. Individual Equipment Specifications.

1.02 SUBMITTALS

A. Form and Format
1. All three (3) copies of the O&M Manual data must be bound within new, white, heavy-duty 3-ring presentation binders with clear-view overlay on the front, back and spine of the binder. Each O&M Manual data binder shall have two typed labels with the project name, REL Contract No., and O&M data name on both the binder fronts and binder spines. A minimum of 12-point font size with Times New Roman font style requested for the binder labels.
2. Paper shall be 20-pound minimum for typed pages. Computer generated data shall be by laser printers.
3. Each binder shall have a table of contents & directory. Tabbed divider sheets shall be white with typed labels that conicide with the table of contents. The tabs shall be in the same sequence as the table of contents and be readable from the left to the right.
4. All tabbed divider sheets shall be heavy weight and have reinforced binder strip to maintain the long-term integrity of the paper.
5. Large data sheets shall be folded and presented in an 8-1/2 inch x 11-inch pocket folder within each O&M Manual binder.
6. Drawings, photographs, and envelopes shall be furnished with reinforced binder holes suitable for the above-mentioned binders and be labeled with appropriate identification.
7. Photocopies shall be legible and suitable for photocopying. All materials shall be reproducible.
8. All components of the submittal shall be typed.

B. Schedule
1. Three (3) copies of the operation and maintenance data shall be submitted prior to the project being 50% complete and prior to equipment installation.

1.03 QUALITY ASSURANCE

A. The operation and maintenance data shall be prepared by trained personnel experienced in the operation and maintenance of the described products, equipment, materials, and finishes.

1.04 CONTENTS

A. Table of Contents
   1. Provide a table of contents with each operation and maintenance manual provided.
      a. Provide a reinforced tabbed divider for each section listed in the table of contents. Main sections shall be numbers; sub-sections shall be letters.

B. Directory
   1. For each item of equipment, list name, address, and telephone number of:
      a. Contractor.
      b. Engineer.
      c. Manufacturer.
      d. Supplier.
      e. Local source of service
      f. Local source for spare parts and replacement.

C. Data to be Included:
   1. Include only product data sheets which are pertinent to the specific product of installation.
   2. Mark-up each product data sheet to:
      a. Identify specific product or part installed.
      b. Identify data applicable to installation.
      c. Delete reference to inapplicable data.
   3. Supplement product data sheets with test and drawings as necessary to illustrate:
      a. Relationship of component parts to equipment and processes.
      b. Controls, regulation and accessories.
      c. Capacities, performance curves, engineering data.
   4. Provide detailed operation and maintenance, troubleshooting and lubrication instructions for each component of equipment. Include disassembly, repair, reassembly and adjustment.
   5. Provide a complete parts list and spare parts stocking recommendations.
   6. Provide start-up and shutdown procedures in a logical and consistent format. Include all points of regulation and control (valves, switches).
   7. Describe normal and emergency operating procedures in detail.
   8. Provide all warranty information including any restrictions or precautions which might affect validity.
   9. Provide other data required under pertinent section of these specifications.
   10. Provide complete instrumentation loop diagrams with tabulated listing of all loop components.
   11. Submit as installed control diagrams by controls manufacturer before issuance of certificate of substantial completion.

1.05 EQUIPMENT MAINTENANCE DATA CARD

A. An "Equipment Maintenance Data Card" MUST be completed for each piece of equipment on the form provided.

PART 2 – PRODUCTS

NOT APPLICABLE

PART 3 – EXECUTION

NOT APPLICABLE

- END OF SECTION -

Equipment No. _____

EQUIPMENT MAINTENANCE DATA CARD

Unit			
Components:	Electrical		
Manufacturer:	Equipment:		
Supplier:	Manufacturer:		
Installation Date:	Type:		
Capacity:	Serial No.:		
Model:	Voltage:	Amps:	RPM:
Serial No.:	Phase:	Frame:	HP:

Item	Work to be Done	Frequency	Time	Comments

SECTION 01740

WARRANTIES

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties.

B. Related Sections
1. Applicable provisions of the General Conditions shall govern terms of the Contractor's special warranty of workmanship and materials.
2. Section 01770, Closeout Procedures.
3. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Divisions 2 through 16.

C. Disclaimers and Limitations
Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.02 DEFINITIONS

A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.03 WARRANTY REQUIREMENTS

A. Starting date for all warranties shall be the date of Substantial Completion as indicated on Certificate of Substantial Completion, except that warranties for work completed after the date of substantial completion shall begin on date of acceptance of such work by the Owner.

B. Related Damages and Losses
When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

C. Replacement Cost
Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Document. The Contractor is

responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse
Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

E. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.04 SUBMITTALS

A. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Prepare warranties as various components of the project are completed.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

- END OF SECTION -

SECTION 01770

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Work included: This section includes project requirements for project completion, record document submittal and closeout procedures.

B. Related Sections:
1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Specific requirements for individual units of work are included in appropriate technical sections.

1.02 DEFINITIONS

A. Time of Closeout:
1. Directly related to "Substantial Completion," may be either a single time period for entire work or series of time periods for individual elements of work that have been certified as substantially complete at different dates. This time variation, if any, shall be applicable to other provisions of this section.

1.03 PREREQUISITES TO PARTIAL COMPLETION

A. General Requirements:
1. Complete before requesting Engineer's inspection for certification of substantial completion for each phase of work. List known exceptions in request.

B. Substantial Completion:
1. Administrative actions and submittals to precede or coincide with Substantial Completion include.
   a. Incomplete Work:
      1) List of incomplete work
      2) Value of incomplete work
      3) Reasons for work being incomplete
   b. Monetary:
      1) Progress payment request coinciding with, or first request following date substantial completion is claimed showing 100 percent complete or list incomplete work.
      2) Submit statement of changes to contract sum.
   c. Regulatory Requirements:
      1) Obtain, submit releases enabling Owners' full, unrestricted use of work and access to services and utilities. Where required, include occupancy permits, operating certificates, similar releases.
   d. Bonding and Insurance:
      1) Request partial release of retainage.
      2) Advise Owner of pending insurance change-over-requirements (if

Builders Risk Insurance is provided by Contractor).

C. Inspection Procedures:
1. When prerequisites are complete, submit request in writing to Engineer stating that all requirements are satisfied, and requesting inspection. Upon receipt of Contractor's request for inspection, Engineer will either proceed with inspection or advise Contractor of unfilled prerequisites.
a. Following initial inspection, Engineer will either prepare certificate of substantial completion, or advise Contractor of work which must be performed before certificate will be issued. Engineer will repeat inspection when requested and when assured that work has been substantially completed.
b. Results of completed inspection will form initial "punch list" for final acceptance.

1.04 PREREQUISITES TO FINAL ACCEPTANCE

A. General Requirements:
1. Complete punch list items, before requesting Engineers inspection for final acceptance and final payment as required by General Conditions. List known exceptions, if any, in request.

B. Final Payment Application:
1. Administrative actions and submittals which must precede or coincide with submittal of final payment application for payment include:
a. Completion of Work:
1) Completion of Project requirements
2) Completion of items specified for completion after Substantial Completion
3) Assurance that work not complete and accepted will be completed without undue delay
4) Final cleaning
b. Transfer of Site to Owner:
1) Removal of temporary facilities and services
2) Removal of surplus materials, rubbish, similar elements
c. Submittals:
1) Consent of Surety (if Performance Bond provided)
2) Assurance that unsettled claims will be settled
3) Transmittal of required project construction records (as-built drawings, etc.) to Owner
4) Certified copy of Engineers final punch list of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance and has been endorsed and dated by Engineer.
5) Evidence of final, continuing insurance coverage complying with insurance requirements.
d. Final payment request including certificates of insurance for products and completed operations where required.
1) Updated final statement, accounting for final additional changes to Contract Sum
2) Final liquidated damages settlement statement, acceptable to Owner

C. Reinspection Procedure:

1. Engineer will reinspect work upon receipt of notice that work, including punch list items resulting from earlier inspections, has been completed, except for items whose completion has been delayed because of circumstances that are acceptable to Engineer will either prepare a certificate of final acceptance, or will advise Contractor of work that is incomplete or of obligations that have not been fulfilled, but are required for final acceptance. If necessary, reinspection procedure will be repeated.

1.05 RECORD DOCUMENT SUBMITTALS

A. Record Drawings:

1. Submit to Engineer a set of record prints marked to show "As-Built" conditions for work of contract.

2. Contractor shall clearly mark each item to record actual construction including:
   a. Measured horizontal and vertical locations of underground utilities and appurtenances.
   b. Field changes of dimension and detail.
   c. Details not contained in original contract documents.
3. Contractor shall ensure record documents are complete and accurate enabling future reference by the Owner.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

- END OF SECTION -

2

DIVISION 2

SITE CONSTRUCTION

SECTION 02200

EARTHWORK

PART 1 – GENERAL

1.01 SUMMARY

A. Work in this section shall include but not be limited to the following:
   1. Excavation.
   2. Test rolling.
   3. Filling and compacting.
   4. Backfilling around structures.
   5. Disposal of surplus materials.
   6. Finish grading.

B. Related Sections & Divisions:
   1. Section 02230, Site Clearing
   2. Section 02936, Landscaping

1.02 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1.	D4318	Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
2.	D1140	Test for Amount of Material in Soils Finer than the No. 200 Sieve
3.	D1556	Test for Density of Soil in Place by the Sand-Cone Method
4.	D1557	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-Lb (4.54 kg) Rammer and 18 in. (457 mm) Drop
5.	D2216	Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures
6.	D2922	Test for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
7.	D3017	Test for Moisture Content of Soil and Soil-Aggregate by Nuclear Method (Shallow Depth)

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals:
   1. Two (2) copies of testing data of laboratory tests to the owner's representative.
   2. Two (2) copies of testing data of tests performed by Contractor to the Owner's representative.

1.04 DENSITY TESTING

A. The Contractor shall secure the services of an established independent Soils Engineer/laboratory for services.

B. The laboratory selection shall be subject to the approval of the Owner's Representative.

C. Testing Requirements

1. Source Testing:
   a. Test all select soils and aggregates for acceptance as required by Section 02290, Soils and Aggregates.
2. Installation Testing:
   a. Determine maximum density and optimum moisture content for compaction in accordance with ASTM D1557 (one test for each type of material for each source).
   b. Conduct field density tests in accordance with ASTM D1556 and/or D2922 and D3017.
   c. Minimum frequency for field density testing shall be two (2) acceptable tests per project or as follows, whichever number is greater:

Fill Utilized For:	Number of Acceptable Tests for Each Class or Fill:
Embankments, dikes or berms	1 test per 600 cubic yards
Structural or controlled fills	1 test per 1,500 square feet, minimum of 1 test per lift
Trench backfill under paved or surfaced areas greater than 15' depth	1 test per 100 feet of trench or any portion there of, in the lower 1/4, each middle 1/4, and upper 1/4 of backfill
Trench backfill under paved or surfaced areas less than 15' depth	1 test per 100 feet of trench or any portion there of, in the lower 1/3, middle 1/3, and upper 1/3 of backfill
Lateral trench backfill	1 test per 100 feet of trench with a minimum of 1 test location per trench in the lower 1/3, middle 1/3, and upper 1/3.
Non-structural fills	1 test per 2,000 cubic yards

3. Additional Density Testing:
   a. Perform under following circumstances:
      1) Soil density does not meet project requirements.
      2) Change in method of compaction.
      3) Change in source or quality of soil or aggregate.
      4) Disturbed cut areas.

D. The Contractor shall be responsible for the cost of all testing.

E. When the testing results show that the work is of an acceptable nature, the acceptance of the work shall not relieve the Contractor from making corrections to the tested work during the warranty period.

PART 2 – PRODUCTS

2.01 SOIL MATERIALS

A. Soil used for borrow, fill, and backfilling shall meet the requirements of soil class as called for on plans or in specifications.

B. As a minimum, all soil shall meet the requirements of Soil Class G-1.

C. All soil classes shall be as per Section 02290, Soils and Aggregates.

PART 3 – EXECUTION

3.01 EXCAVATION

A. Excavation to Correct Grade
   1. Excavate site of structures and pavements as follows:
      a. To elevation shown on the plans.
      b. To such additional width as necessary for erection and removal of forms, shoring or sheeting, and finishing of walls.
   2. Excavation of unsuitable materials.
      a. Excavate unsuitable soil materials under a proposed structure.
      b. Excavation shall extend lateral a minimum of 5 feet beyond the building limits plus 1 foot for each foot of cut below the foundation.
      c. Notify the Owner's project representative prior to proceeding with their removal of unsuitable material.

B. Borrow Excavation
   1. Clear site in accordance with Section, 02230, Site Clearing.
   2. Strip and stockpile topsoil.
   3. Excavate, haul, place, and compact borrow soil material.
   4. Regrade borrow areas as shown on the plans or in an acceptable manner to facilitate proper site drainage.
   5. Replace stockpiled topsoil.
   6. Surplus topsoil may be utilized in borrow area regarding.
   7. Seed and mulch in accordance with Section 02936, Landscaping.

C. Excavation Precautions
   1. Excavation slope stability.
      a. Maintain excavation slope to ensure a stable excavation and prevent caving.
      b. Provide and erect all timber work, shoring, sheeting, bracing, etc. necessary to prevent caving and displacement of adjacent property.
         1) Shoring shall be placed so as not to interfere with building work.
         2) Shoring shall be independent of footings.
   2. Underpinning existing structures.
      a. Underpin as necessary to protect existing structures and foundations.
      b. Furnish all material, labor, and equipment necessary to complete underpinning operations.
   3. Dewatering of excavations.
      a. Contractor shall provide and maintain all equipment necessary to keep excavated areas free of all groundwater, surface water, or precipitation.
      b. Soil which becomes soft, yielding, or loses support due to inadequate dewatering efforts shall be dealt with as follows:
         1) Excavate disturbed soil materials for their entire depth.
         2) Replace excavated materials with an approved fill material.
   4. Protect excavation from freezing.
      a. Take precautions necessary to prevent frost from entering subgrade soils.
      b. If subgrade becomes frozen, remove snow, ice, and frozen soil prior to placement of additional fill or finish surfacings.

3.02 FILLING AND COMPACTING

A. Layer thickness for fill soil shall be as follows:
   1. Layer thickness shall be dependent on the soil classification type, weight, and soil contact pressure of compaction equipment being used.
   2. Layer thickness shall not exceed 8 inches.

B. Compaction
   1. Compaction method for fill soils shall be appropriate for soil material being compacted and provide sufficient soil contact pressure to thoroughly compact entire lift thickness.

C. Proper soil moisture contents for compaction shall be maintained in all soils.
   1. Optimum moisture content as determined by Modified (ASTM D1557) Proctor shall be used to determine acceptance moisture contents for soil compaction.
   2. Contractor shall scarify and compact existing ground prior to placing fill material.

D. Compaction requirements for all fill soils unless specified elsewhere shall be as follows:

Class 1 -Fills supporting structures.
- Subgrade under pavements or floors.
- Backfill under piping and conduits.

Class 2- Fills which do not support structures.

COMPACTION REQUIREMENTS FOR
VARIOUS SOIL CLASSES

	Required Compaction (%) of Modified Proctor Density	
Soil Class	Class 1	Class 2
B-3 through B-4	95	90
C-1 through C-6	95	90
D-1 through D-3, and G-1 and G-2	95	90
E-1	95	90

3.03 TEST ROLLING

A. The following testing services shall be provided:
   1. The subgrade condition and elevation shall be checked by the Engineer prior to placement of fill material. The subgrade will be proof rolled using a tandem axle dump truck fully loaded with fill material to the maximum legal weight limit. The fill condition and elevation shall be checked by the Engineer prior to placement of subsequent courses.

B. Treat areas showing yielding or rutting under test rolling as follows:
   1. Replace and/or recompact as necessary to stabilize the area.
   2. Retest soil areas replaced or recompacted.

3.04 BACKFILLING AROUND STRUCTURES

A. Do not backfill any foundation, wall, or structure prior to inspection by the Engineer.

B. Backfilling under pipes or conduits in areas excavated due to construction.
   1. Contractor shall furnish and compact Soil Class A-7 under all piping or conduits.
      a. Compact fill shall extend from undisturbed earth to grade.
      b. Place and compact fill in all areas disturbed by construction.

3.05 DISPOSAL OF SURPLUS MATERIALS

A. The Owner shall have prior claim to all surplus excavated material. If such claim is exercised by the Owner, the material shall be deposited at such points as may be directed by the Engineer at the expense of the Contractor, the haul not to exceed two (2) miles. If Owner does not desire to claim surplus excavated material, the Contractor shall be totally responsible for obtaining a disposal site. No material shall be disposed of in a floodplain, wetland or waterway.

After delivery to any designated location, such material shall be leveled off by the Contractor.

3.06 FINISH GRADING

A. Grade, trim, and shape subgrade to required grade and section.
   1. Adjust slopes by grading so that transition is smooth and gradual.
   2. The crests of cut banks shall be rounded and shaped.
   3. Washouts and ruts shall be refilled, regarded, and properly compacted.
   4. Remove all stones 3 inches or larger from grading limits.

B. Vertical Grading Tolerances
   1. Rough grading tolerance.
      a. Areas to be topsoiled – rough grade to within 0.2 foot of finish grades.
   2. Areas having paved surfaces (i.e., concrete, asphalt, etc.).
      a. Maximum allowable variation from correct profile and section shall not be more than ¼-inch in 10 feet.

- END OF SECTION -

SECTION 02201

EARTHWORK
(ROADWAY CONSTRUCTION)

PART 1 – GENERAL

1.01 SUMMARY

A. Work included: This section shall include everything necessary for earthwork for roadway construction.

B. Related Section and Divisions:
   1. Applicable provisions of the general conditions shall govern as work in this section.
   2. Section 01300, Submittals.

1.02 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1.03 SUBMITTALS

A. Submit two (2) copies of test reports performed by Contractor in accordance with section 01300, Submittals.

PART 2 - PRODUCTS

2.01 CLEAN EARTH FILL

A. Soil used for borrow, fill, and backfilling shall meet the requirements of soil class as called for on plans or in specifications.

B. Clean earth fill shall be void of the following:
   1. Stones or rocks larger than 3-inches.
   2. Organic content.
   3. Silty clays with high plasticity.
   4. Man-made rubble.
   5. Contaminated or hazardous waste.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Clear and grub site and dispose of vegetation.

B. Strip and stockpile topsoil. Topsoil not used in the project shall be stockpiled and remain on the property of the owner unless otherwise noted.

C. Excavate to elevation, grade and section as shows on the plans

D. Excavate for any proposed structure as follows:
   1. Remove any unstable material from under structures.
   2. Undercut material shall be removed and replaced with compacted backfill sloped 1:1 at its perimeter.
   3. Removal of unstable material shall be done only with the owner's approval.

3.02 SUBGRADE COMPACTION IN CUTS

A. Compact subgrade to a density of not less than 95 percent of modified proctor.

3.03 SUBGRADE COMPACTION IN FILL AREAS

A. Contractor shall scarify and compact existing ground prior to placing fill material.

B. Compact fill in layers not exceeding 8 inches in thickness.

C. Compact subgrade to a density of not less than 95 percent of modified proctor.

3.04 MOISTURE REQUIREMENTS

A. Proper soil moisture contents for compaction shall be maintained in all soils.
   1. Optimum moisture content as determined by Modified (ASTM D1557) Proctor shall be used to determine acceptable moisture contents for soil compaction.

3.05 DEWATERING

A. The Contractor shall be responsible for the following:
   1. Determination of groundwater conditions.
   2. Providing and maintaining necessary means and methods to dewater excavations.
   3. Disposal of water.
   4. Prevention of runoff and discharge from entering excavations & subgrade.
   5. Securing permits from all regulatory, governmental agencies governing dewatering.
   6. Providing pumping equipment, generating equipment, and/or power.
   7. Maintaining dewatering operation and prevention of water from entering the work area until backfilling, placement of fill, base course, and compaction procedures are completed.

3.06 DISPOSAL OF SURPLUS MATERIAL

A. The Owner shall have prior claim to all surplus excavated material. If such claim is exercised by the Owner, the material shall be deposited at such points as may be directed by the Engineer at the expense of the Contractor, the haul not to exceed two (2) miles. If Owner does not desire to claim surplus excavated material, the Contractor shall be totally responsible for obtaining a disposal site. No material shall be disposed of in a flood plain, wetland or waterway.

B. After delivery to any designated location, such material shall be leveled off by the Contractor.

3.07 FINISH GRADING

A. Grade, trim, and shape subgrade to required grade and section.

1. Adjust slopes by grading so that transition is smooth and gradual.
2. The crests of cut banks shall be rounded and shaped.
3. Washouts and ruts shall be refilled, regraded, and properly compacted.
4. Remove all stones 3 inches or larger from grading limits.

B. Grade shall be finished within 0.05 feet at required line and grade.

3.08 TESTING

A. Contract with an independent testing laboratory to provide testing services required by this section. Contractor shall be responsible for the cost of all testing required for submittals.

B. The following testing services shall be provided:
1. Source Testing:
   a. Test all soils for acceptance as required by Section 02290, Soils and Aggregates for Soils.
   b. Test all aggregate for acceptance as required by Section 02235, Crushed Aggregate Base Course.
2. Installation Testing:
   a. Determine maximum density and optimum moisture content for compaction in accordance with ASTM D1557 (one test for each type of material for each source).
   b. Conduct field density tests in accordance with ASTM D1556 and/or D2922 and D3017.
3. Perform additional testing when:
   a. Densities do not meet project requirements.
   b. Change in material source.
   c. Change in compaction methods.
4. Minimum frequency for field density testing shall be two (2) acceptable tests per project or as follows, whichever number is greater:
   a. Perform one (1) density test per 350 square yards per lift or every 100 lineal feet of roadway in accordance with ASTM 1556 and/or D2922.

C. The provisions of the above testing requirements may be waived by the Engineer in lieu of the following testing methods.
1. The subgrade condition and elevation shall be checked by the Engineer prior to placement of basecourse material. The subgrade will be proof rolled using a tandem axle dump truck fully loaded with basecourse material to the maximum legal weight limit. The basecourse condition and elevation shall be checked by the Engineer prior to placement of the asphalt binder material.

D. When the testing results show that the work is of an acceptable nature, the acceptance of the work shall not relieve the Contractor from making corrections to the tested work during the warranty period.

PART 4 – MEASUREMENT AND PAYMENT

A. Excavation
1. Work under this section shall be incidental to the project or paid for as shown in the bid schedule.

2. Payments for excavation shall include:
   a. Hauling and grading.
   b. Compaction of grade.
   c. Backfilling and compacting around structure.
   d. Disposal of surplus material off site as necessary.
   e. Finish grading.
   f. Testing.
   g. Clearing and grubbing.
   h. Stripping and stockpiling topsoil.
   i. Erosion Control

- END OF SECTION -

SECTION 02203

CUTTING AND PATCHING (ROADWAYS)

PART 1 - GENERAL

1.01 SUMMARY

A. Work included: This section shall consist of the replacement and repair of pavement, including any existing patching or surfacing materials disturbed by construction. Work covered by this section shall include but not limited to the following:
   1. Sawcutting of pavement edges.
   2. Removal of sidewalks, driveways and curb and gutter.
   3. Excavation, removal, and disposal of pavement material.
   4. Replace and compact subbase material.
   5. Replacement of pavement material in kind.

B. Related Sections and Divisions:
   1. Applicable provisions of the general conditions shall govern the work in this section.
   2. Section 02201, Earthwork (Roadway Construction).
   3. Section 02235, Crushed Aggregate Base Course (Roadway Construction).
   4. Section 02505, Asphaltic Concrete Pavement.
   5. Section 02521, Concrete Curb and Gutter.
   6. Section 02775, Concrete Sidewalk and Driveway.
   7. Section 03200, Concrete Reinforcement.
   8. Section 03251, Expansion and Contraction Joints.
   9. Section 03303, Cast-In-Place Concrete, Street Work.

C. All replacement of pavement material shall be performed by a contractor whose primary business is concrete or bituminous roadwork. The contractor shall be listed on the subcontractor list, included with the bid & approved by the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Bituminous pavement, concrete and base material shall be equal in quality and kind as to the materials removed, unless otherwise specified.

B. Materials shall be approved prior to installation.

PART 3 - EXECUTION

3.01 PREPARATION

A. Perform cutting and patching without injury to remaining adjacent pavement and concrete

B. Unless indicated otherwise, roadway shall be kept open to all traffic during performance of work.

C. Remove pavements, sidewalks, driveways and curb and gutter to the construction limits.

D. Sawcut vertically all pavement, sidewalks, and driveways to a minimum depth of 3 inches prior to breaking.

E. Remove all curb and gutter and sidewalks to nearest joint outside work area.

F. Sheet and brace trench walls if necessary to maintain cutting and patching within limits.

G. At a minimum, replacement shall be a full-lane width patch.

H. Subbase, base, pavement, sidewalks, driveways, and curb and gutter shall be prepared and placed in accordance with the plans and applicable specifications.

I. Minimum thickness shall be as follows:
   1. Bituminous pavement shall be 3" unless otherwise shown on plans.
   2. Concrete pavement in roadways shall be 6" unless shown otherwise on plans.
   3. Concrete pavement in sidewalks shall be 4" unless shown otherwise on plans.

PART 4 – MEASUREMENT AND PAYMENT

A. Work under this section shall be incidental to the project or paid for as shown in the bid schedule.

- END OF SECTION -

SECTION 02220

TRENCHING, BACKFILLING AND COMPACTION

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This Section shall include all work required for trenching, backfilling, and compaction of utility trenches.

B. Related Sections and Divisions:
1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Section 01563, Erosion Control.
4. Section 02565, Forcemain.
5. Section 02600, Buried Piping.
6. Section 02616, Ductile Iron Pipe.
7. Section 02622, PVC Plastic Pipe.
8. Section 02623, Polyethylene Pipe
9. Section 02624, PVC Lined RCP Sewer.
10. Section 02625, Centrifugally Cast Fiberglass Mortar Pipe.
11. Section 02720, Storm Sewer and Drainage.
12. Section 02730, Sanitary Sewer.

1.02 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1.	D4318	Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
2.	D1140	Test for Amount of Materials in Soils Finer than the No. 200 Sieve.
3.	D1556	Test for Density of Soil in Place by the Sand-Cone Method.
4.	D1557	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-Lb (4.54 kg) Rammer and 18 in. (457 mm) Drop.
5.	D2216	Laboratory Determination of Water (moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures
6.	D2922	Test for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
7.	D3017	Test for Moisture Content of Soil and Soil-Aggregate by Nuclear Method (Shallow Depth).

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals:
1. Two (2) copies of testing data of laboratory tests and test performed by Contractor.
2. Two (2) copies of testing data to the Owner's Representative.
3. Shoring, bracing and sheet piling procedures and details.

1.04 PROJECT/SITE CONDITIONS

A. Do not block or obstruct sidewalks or pavement with excavated materials without approval from Owner.

B. When close sheeting is required, drive to prevent soil from entering trench below or through sheeting.

C. Fill voids remaining after sheeting is pulled with approved material.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.01 GENERAL

A. It shall be the Contractor's responsibility to comply with all federal, state, and local rules and regulations concerning:
   1. Construction safety including confined entry.
   2. Noise Control
   3. Dust and smoke control

B. Heating
   1. When weather dictates, provide temporary heat to protect work prone to freezing.

C. Access to Public Services
   1. Insure free access to all fire hydrants, valve boxes, manholes, curb stops, fire alarms, police call boxes, etc.
   2. Contractor shall be responsible for notifying police, sheriff, fire department, ambulance services, and school bus services before blocking or partially blocking any public thoroughfare.

D. Protection of Work, Public, and Property
   1. Provide safe passage for local traffic, pedestrian and vehicular.
   2. Provide access to properties abutting street where utilities are being constructed.
   3. Provide all necessary barricades, warning lights, and signs, signals, flagmen, etc. in accordance with federal, state, and local regulations.

E. Work on Streets and Work In Waterways and Wetlands
   1. Work on streets or in waterways and wetlands are subject to provisions of special permits required and issued by governmental agencies having jurisdiction in addition to requirements of specification for this work.
   2. Work shall not commence prior to receiving required permits.
   3. Provide special bonds when required by permit.
   4. Notify controlling authority prior to beginning and after completing any construction in right-of-ways or streams.
   5. Bear all expenses related to permit compliance.

F. Easements
   1. Owner will provide all easements. Contractor shall verify easements one in place prior to commencing work.
   2. All work on easements will be in strict compliance with the terms of the easements.
   3. Owner, easement grantee, Contractor and Engineer shall be in full agreement on the method of execution prior to beginning work.
      a. Only structures, trees, shrubs, and other obstructions are to be removed as mutually agreed.
      b. Restoration shall be equal to original condition or the conditions of the agreement.

G. Protection of Established Property Markers
   1. Contractor shall protect all property markers (iron pipe, concrete, or wood posts, steel pins) from movement from original position.
   2. Cost of replacement of property markers moved during construction shall be at Contractor's expense.

3.02 OBSTRUCTIONS AND CONFLICTS

A. When existing utilities and structures are indicated on the drawings, it should not be assumed that all existing utilities and structures are shown.

B. The locations of existing utilities and structures when given, are plotted on the drawings for the information of the Contractor, but should not be construed as a representation of the exact location.

C. When an underground structure not shown or indicated occupies the alignment of the proposed pipe or structure, the Contractor shall give immediately notice to the Engineer and the Owner of the structure of such conflict. The Owner will issue a change order to remove, relocate or alter the structure, plan, or profile of the proposed structure as required to eliminate the conflict.

D. The Contractor shall be responsible for all injuries to any below or above ground utilities and structures encountered during construction.

E. The Contractor shall make arrangements with the utility companies for any relocation of Interfering utilities. No extra cost due to unexpected delays or coordination work shall be incurred by the Owner except for authorized utility alterations performed by the Contractor as provided below.

F. Any underground utilities or other structures that are located outside of the construction limits of this contract which the Contractor wishes to have moved to facilitate construction shall be arranged with the owner of such structures, the Contractor shall pay all costs of the accommodation.

G. Separation of Watermains and Sewers
   1. The following separations shall be minimum:
      a. Parallel
         1) Eight feet, measured center to center
      b. Vertical (when pipelines cross)
         1) Watermain below a sewer - 18 inches clear
         2) Watermain above a sewer - 6 inches clear

2. When crossing a sewer, center a full length of watermain or sewer to position joints as far as possible from sewer.

H. The Contractor shall be responsible to:
1. Maintain or provide temporary service for water, sewers, gas, culverts, drains, electricity, or other utilities interrupted.
2. Provide temporary connections and outlets for all private and public utilities that are interrupting construction.
3. Provide disposal for all drainage and wastewater resulting from relocations and/or interruptions in accordance with regulations and permits of the controlling governmental agency(s).

I. In the event the Contractor fails to make restitution to any damaged property, the Owner reserves the right to deduct the cost of repairs from monies due him.

J. Obstruction Removal
1. Clear all obstructions from within the construction limits.
2. Remove pavement, curb and gutter, sidewalks and driveways within the trench limits.
3. Construction limits shall be defined as:
   a. Street right-of-ways.
   b. Project site property lines.
   c. Easement limits.

3.03 DEWATERING

A. The Contractor shall be responsible for the following:
1. Determination of groundwater conditions.
2. Providing and maintaining necessary means and methods to dewater excavations.
3. Disposal of water.
4. Prevention of runoff and discharge from entering excavation.
5. Securing permits from all regulatory, governmental agencies governing dewatering.
6. Providing all wells, pumping equipment, generating equipment and/or power.
7. Damage caused to private wells due to dewatering.
8. Maintaining a water supply to all wells affected by the dewatering operation.
9. Dewatering to a minimum depth of 12 inches below all excavations.
10. Maintaining dewatering operation until backfilling and compaction procedures are completed.
11. Removing all dewatering equipment and removing/abandoning wells in accordance with regulatory agency requirements.

B. Groundwater Disposal
1. Convey groundwater to point of discharge through pipelines.
   a. Open ditches and trenches are not permitted.
   b. Use of Owner's utilities is not permitted without written consent.
2. Maximum Sediment Content- 10 milligrams per liter.

3.04 TRENCHING

A. Excavate to the depth and width necessary to install the intended pipeline.

B. Contractor shall excavate whatever materials are encountered as required to complete the work. The bottom of the trench shall be leveled off, all loose and disturbed soils removed and hard tamped prior to installation of pipe.

C. The trench at the crossing of underground utilities in place shall be as narrow as practicable. All underground utilities shall be protected from damage and maintained in service at their original location and grade during the work. Any damage to underground utilities shall be replaced or repaired at no cost to the Owner.

D. Immediately upon backfilling in paved areas, a temporary 3-inch thick bituminous (cold mix) concrete pavement shall be placed and maintained daily to provide a smooth even surface until final surface replacement is made.

E. Pipe bedding shall be in accordance with the standard details shown on the drawings.

3.05 BACKFILLING

A. When backfilling, the Contractor shall insure that the backfill is free of:
1. Stones larger than 3 inches.
2. Frozen material.
3. Concrete and rubble.
4. Blasted rock.
5. Vegetation and organic material.
6. Refuse and debris.

B. No backfill shall be placed under water or over unsuitable subgrade conditions as determined by Owner's representative.

C. Pipe backfill shall be in accordance with the standard details shown on the drawings.

3.06 COMPACTION

A. Compact fill in horizontal layers not exceeding 8 inches in thickness.

B. Provide specified compaction through entire lift thickness by mechanical compaction. Compaction with a backhoe bucket is not acceptable.

C. Proper soil moisture contents for compaction shall be maintained in all soils.
1. Optimum moisture content as determined by Modified (ASTM D1557) Proctor shall be used to determine acceptable moisture contents for soil compaction.

D. Compaction requirements for all fill soils unless specified elsewhere shall be as follows:

Class 1 - Fills supporting structures.
- Subgrade under pavements or floors.
- Backfill under piping and conduits.
- Trench backfill over pipelines.
- Trenches within existing or proposed roadways, sidewalks, driveways, shoulders, and other hard surfaces.

Class 2 – Fills which do not support structures.

COMPACTION REQUIREMENTS FOR VARIOUS SOIL CLASSES

	Required Compaction (%) of Modified Proctor Density	
Soil Class	**Class 1**	**Class 2**
B-3 through B-4	95	90
C-1 through C-6	95	90
D-1 through D-3, and G-1 and G-2	95	90
E-1	95	90

D. Pipe backfill shall be in accordance with the standard details shown on the drawings.

3.07 TESTING

A. The Contractor shall secure the services of an established independent Soils Engineer/laboratory for services as follows:
   1. The laboratory selection shall be subject to the approval of the Owner's representative.

B. Testing Requirements:
   1. Source Testing:
      a. Test all soils and aggregates for acceptance as required by Section 02290, Soils and Aggregates.
   2. Installation Testing:
      a. Determine maximum density and optimum moisture content for compaction in accordance with ASTM D1557 (one test for each type of material for each source). Maximum density test results shall be submitted to the Engineer within 48 hours after starting construction.
      b. Conduct filed density tests in accordance with ASTM D1556 and/or D2922 and D3017. Provide the Engineer with the test results at the end of each work day.
      c. If the contractor proceeds with backfilling without density testing or without a maximum density test, he does so at his own risk. Any portion of the work that does not meet the contract specifications will be removed and recompacted at the contractor's expense.
   3. Perform additional testing when:
      a. Densities do not meet project requirements.
      b. Change in material source.
      c. Change in compaction methods.
   4. Minimum frequency for filed density testing shall be two (2) acceptable tests per project or as follows, whichever number is greater:

Fill Utilized For:	Number of Acceptable Tests:
Trench backfill under paved or surfaced areas greater than 15' depth	1 test per 100 feet of trench or any portion there of, in the lower 1/4, each middle 1/4, and upper 1/4.
Trench backfill under paved or surfaced areas less than 15' depth	1 test per 100 feet of trench or any portion there of, in the lower 1/3, middle 1/3, and upper 1/3.

Lateral trench backfill	1 test per 100 feet of trench with a minimum of 1 test location per trench, in the lower 1/3, middle 1/3, and upper 1/3.
Backfill under structures or floors	1 test per 1,500 square feet, minimum of 1 test per lift.

5. All field density testing shall be performed during trench backfilling and compaction operations. Spot excavation and density testing after backfilling and compaction has been completed is not acceptable.
6. The Contractor shall be responsible for the cost of all testing.
7. When the testing results show that the work is of an acceptable nature, the acceptance of the work shall not relieve the Contractor from making corrections due to failure of the tested work during the warranty period.

3.08 DISPOSAL OF SURPLUS MATERIALS

A. The Owner shall have prior claim to all surplus excavated material. If such claim is exercise by the Owner, the material shall be deposited at such points as may be directed by the Engineer at the expense of the Contractor, the haul not to exceed two (2) miles. If Owner does not desire to claim surplus excavated material, the Contractor shall be totally responsible for obtaining a disposal site. NO material shall be disposed of in a floodplain, wetland, or waterway.

After delivery to any designated location, such material shall be leveled off by the Contractor.

B. Pavement shall be disposed of separately from the soils material.

3.09 SHEETING AND BRACING

A. Contractor shall provide adequate sheeting and bracing to prevent earth from caving or washing into the trench, and shall do all shoring and underpinning to properly support adjacent structures.

B. Trenches and excavations shall be sheeted and braced as required by applicable federal and state code, and as may be determined by the Contractor to be necessary to protect life and property.

C. When close sheeting is necessary, it shall be driven sufficiently to prevent soils from entering the excavation.

D. Sheeting shall be removed during backfilling. Remove sheeting in a manner that will protect the completed pipeline adjacent structures from disturbance.

3.10 TRENCH BOX

A. A trench box shall be used at the Contractor's discretion.

B. Trench box shall conform to the following:
   1. Shall not exceed trench limits.
   2. Shall be constructed in accordance with governing authorities.
   3. Shall be utilized in a manner that will not disturb the pipeline when the trench box is moved.

3.11 RESTORATION

A. Contractor shall clean the site of all surplus excavated material, rubbish and debris, and construction material.

B. Culverts removed for the purpose of installing pipeline shall be reinstalled to their original position. Any culverts damaged during removal or construction activities shall be replaced by the Contractor.

- END OF SECTION -

SECTION 02230

SITE CLEARING

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section includes all work associated with site clearing.

B. Related Sections and Divisions:
1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Section 01563, Erosion Control.
4. Section 02290, Soils and Aggregates.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Topsoil as referred to in this section shall be a soil material as defined by Soil Class F-1, in accordance with Section 02290, Soils and Aggregates.

PART 3 - EXECUTION

3.01 PREPARATION

A. Contractor shall identify existing plant life to remain and tag accordingly in the presence of the Engineer.

3.02 PROTECTION

A. Contractor shall protect from damage utilities and structures that are to remain.

B. Contractor shall protect all trees, plants and features designated to remain as final landscaping.

C. Protect all survey monuments.

3.03 CLEARING, GRUBBING, AND DISPOSAL

A. Select Clearing
Remove all brush, shrubs, stumps, and trees to within 4 inches of the existing ground surface where designated by the Owner's representative.

B. Grubbing
1. Remove all stumps, roots, logs, and timber.
2. Grubbing shall be carried to a minimum depth of 12 inches.

C. Disposal
   1. The Owner reserves right to all excess top soil, if desired.
   2. Contractor is responsible for the following:
      a. Disposal of all material removed under clearing and grubbing if not wanted by the Owner.
      b. Furnishing of a disposal site.
      c. Obtain and conform to all necessary, federal, state, and local permits for burning and/or burial of material.
      d. Conform to all requirements for disposal of diseased trees.
      e. If permits are not required, Contractor shall comply with the following requirements:
         1) Open burn in a manner as not to damage adjacent trees, shrubs, property, impede traffic, or create a nuisance.
         2) Cover disposal material in a manner that shall minimize future cover settlement.
         3) Maintain a minimum of 2 feet of soil cover.

D. Clearing operations shall be completed in a manner so as to prevent obstruction of traffic and to protect all remaining trees, shrubs, and other vegetation from injury.

3.04 TRIMMING

A. With permission from the Engineer, the Contractor may trim overhanging branches or limbs that interfere with the construction operation. All branches damaged during construction shall be neatly trimmed.

3.05 STRIPPING AND STOCKPILING TOPSOIL

A. Stripping
   1. Remove all topsoil beneath:
      a. Structures.
      b. Roadways.
      c. All paved areas.
   2. Remove topsoil to a depth of 6 inches in:
      a. Areas disturbed by utility construction.
      b. Areas requiring cuts or significant fills (significant fills are fills which cannot be obtained by the addition of topsoil only).

B. Stockpiling
   1. Contractor shall stockpile topsoil obtained in the stripping operation for replacement.
      a. For areas where topsoil is to be replaced after underground utility construction.
      b. For areas involving site grading where topsoil is to be replaced in order to sustain vegetative growth.
   2. In areas where topsoil will not be required as specified above, Contractor shall remove and dispose of excess material as defined in other sections.

- END OF SECTION -

SECTION 02235

CRUSHED AGGREGATE BASE COURSE (ROADWAY CONSTRUCTION)

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included: This section includes constructing a crushed aggregate base for roadways shouldering, curb and gutter, and parking lots.

B. Aggregates from recycled material may not be used unless required as part of this project.

1.02 REFERENCE STANDARDS

A. ASTM: American Society for Testing and Materials

B. AASHTO: American Association of Highway and Transportation Officials

C. W.D.O.T.: Standard Specifications for Highway and Structure Construction, Latest Edition.

1.03 SUBMITTALS

A. Test results for aggregate materials supplied for use on this project may be from a source which was approved for a previous project, provided the submitted test results were obtained within 6 months previous to this submittal
   1. Source testing report.

B. Submit two (2) copies of testing data of tests performed by Contractor:
   1. Test reports must include location in work where test was taken.

C. Delivery Tickets
   1. Provide delivery tickets daily for each load of crushed aggregate for base course delivered to the work, including:
      a. Date.
      b. Tare and net weight.
      c. Type of material.

D. Samples
   1. Provide material samples needed for required testing.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Aggregates
   1. Aggregates shall consist of hard, durable particles of crushed stone or crushed gravel and a filler of natural sand, stone sand or other finely divided mineral matter.
      a. Remove oversize material by screening or by crushing to required sizes.

b. Composite material shall be free from organic matter, shale, and lumps or balls of clay and shall conform to the gradation requirements below.

2. Liquid limit and plasticity index.
   a. Aggregate including any blended filler shall have a liquid limit of not more than 25 and a plasticity index of not more than 6.
3. Fracture Count
   a. At least 45% of particles retained on the No. 4 sieve shall have at least one fractured face.
4. Soundness
   a. When the fraction of aggregate retained on the No. 4 sieve is subjected to five cycles of the sodium sulfate soundness test, weighted loss shall not exceed 18% by weight.
5. Filler for blending
   a. Additional mineral filler require to meet gradation requirements or for satisfactory binding of material shall be uniformly blended with base course material at the screening plant.
   b. Mineral fillers shall be free from agglomerations or lumps and shall contain not more than 15% of material retained on a No. 4 sieve
6. Moisture content: Shall not exceed 7%.

2.02 GRADATION REQUIREMENTS

A. Gradation No. 1

% By Weight Passing

Sieve Size	Crushed Gravel	Crushed Stone
1½-inch	100	100
1 inch	75-100	--
3/8-inch	40-75	30-65
No. 4	30-60	25-55
No. 10	20-45	15-40
No. 40	10-30	--
No. 200	3-10	2-12

B. Gradation No. 2

% By Weight Passing

Sieve Size	Crushed Gravel	Crushed Stone
1-inch	100	100
3/8-inch	50-85	40-75
No. 4	35-65	25-60
No. 10	25-50	15-45
No. 40	10-30	--
No. 200	3-10	3-12

C. Gradation No. 3
% By Weight Passing

Sieve Size	Crushed Gravel	Crushed Stone
1-inch	100	100
¾- inch	95-100	95-100
3/8-inch	50-90	50-90
No. 4	35-70	35-70
No. 10	20-55	15-55
No. 40	10-35	--
No. 200	8-15	5-15

D. Gradation No. 4
% By Weight Passing

Sieve Size	% By Weight Passing
1¼-inch	95 – 100
¾-inch	70 – 93
3/8-inch	45 – 80
No. 4	30 – 63
No. 10	20 – 48
No. 40	8-28
No. 200	2.0 – 12.0

E. Breaker Run Base Course

Sieve Size	% By Weight Passing
3-inch	90- 100
1½-inch	60 – 85
¾-inch	40 – 65
No. 4	15 – 40
No. 10	10 – 30
No. 40	5 – 20
No. 200	2 – 12

PART 3 - EXECUTION

3.01 PREPARATION OF SUBGRADE

A. Preparation of subgrade for crushed aggregate base course shall be in accordance with requirements of Section 02201, Earthwork for Roadway Construction.

B. Do not place the base course on a subgrade that is soft or spongy or one that is covered by ice or snow.

C. Do not place base course material on a dry or dusty subgrade when existing condition would cause rapid dissipation of moisture from base course material and hinder or preclude its proper compaction.
1. Apply water to such dry foundations and rework or recompact as necessary.

3.02 AGGREGATE USAGE

A. Lower Layer Of Roadways and Shoulders:

1. Use gradation No. 1 or breaker run (as shown on plans).

B. Top Layer of Roadways: Gradation No. 3

C. Top Layers of Shoulders: Gradation No. 2

3.03 CONSTRUCTION METHODS

A. Place crushed aggregate base course to the width and thickness shown on plans.
   1. Maximum compacted thickness of any one layer shall not exceed six (6) inches.
      a. When multiple courses are required, they shall be composed of approximately equal thicknesses.

B. Spreading Base Material
   1. The work shall proceed so that the hauling equipment will travel over the previously placed material.
   2. No hauling shall be permitted on the subgrade.
   3. Route hauling equipment as uniformly as possible over all portions of the previously constructed layers of the base course.

C. Compaction
   1. After a layer of course has been placed and spread to the required thickness, width, and contour, it shall be compacted.
   2. If the material is deficient in moisture content, add moisture during compaction operations by means of appropriate equipment.
   3. Each layer or course of subbase or base placed shall be compacted to a minimum of 95% Modified Proctor.
   4. Areas where proper compaction cannot be obtained due to segregation of materials, excess fines or other deficiencies shall be reworked or the material be removed and replaced with material that will yield the desired results.
   5. Maintain line and grade during compaction operations.

D. Maintenance
   1. The Contractor shall be responsible for and maintain the base course until surface paving is complete.

E. Dust Control
   1. Contractor shall maintain dust control until paving is completed.
   2. Dust control shall be by the application of water or an approved dust control material.

3.04 SHOULDERING

A. Construct shoulders with base course material and conform with the elevation and section shown on the plans.

B. When the finish course of bituminous paving is not placed immediately after the binder course, shouldering shall be placed flush with the surface of the binder.

C. The remainder of the shouldering shall be completed after the finish bituminous course is placed.

D. Shouldering equipment shall be capable of placing shouldering material without marring or damaging pavement or appurtenance.

E. Littering of the pavement with base material shall be corrected by brooming.

3.05 TESTING

A. Contractor shall secure the services of an established independent laboratory for soil testing services as follows:
   1. Source testing
      a. Sampling: AASHTO T2
      b. Sieve Analysis
         1) AASHTO T27 for aggregates including fracture count
         2) AASHTO T37 for mineral fillers
      c. Liquid test: AASHTO T89
      d. Plasticity index: AASHTO T90
      e. Soundness: AASHTO T104 using sodium sulfate
      f. Standard Proctor: ASTM D698
   2. Installation testing
      a. The basecourse condition and elevation shall be checked by the Engineer prior to placement of subsequent basecourse or bituminous material. The basecourse will be proof rolled using a tandem axle dump truck fully loaded with basecourse material to the maximum legal weight limit.

B. When the testing results show that the work is of an acceptable nature, the acceptance of the work shall not relieve the Contractor from making corrections to the tested work during the warranty period.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

A. Work under this section shall be incidental to the project or paid for as shown in the bid schedule.

B. Base Course
   1. Measurement shall be by the square yard in place.

   2. Payment shall include:
      a. Labor, material and equipment.
      b. Hauling and placing.
      c. Compacting and grading.
      d. Dust control.
      e. Adjusting manholes and valves.
      f. Testing.

C. Shouldering
   1. Shall be incidental.

- END OF SECTION -

SECTION 02290

SOILS AND AGGREGATES

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Work Included:
This section includes all material, labor, and equipment necessary to produce, haul, place, and compact the specified soil or aggregate.

B. Related Sections and Divisions:
1. The applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Section 02220, Trenching, Backfilling and Compaction.

1.02 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1.	ASTM C33	Spec. for Concrete Aggregates.
2.	ASTM C88	Test for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
3.	ASTM C117	Test for Material Finer than No. 200 Sieve in Mineral Aggregates by Washing.
4.	ASTM C131	Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
5.	ASTM C136	Sieve Analysis of Fine and Coarse Aggregates.
6.	ASTM C144	Spec. for Aggregate for Masonry Mortar.
7.	ASTM C207	Spec. for Hydrated Lime for Masonry Purposes.
8.	ASTM C535	Test for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
9.	ASTM C602	Spec. for Agricultural Liming Materials.
10.	ASTM D75	Sampling Aggregates.
11.	ASTM D422	Particle Size Analysis of Soils.
12.	ASTM D448	Spec. for Standard Sizes of Coarse Aggregate for Highway Construction.
13.	ASTM D1140	Test for Amount of Material in Soils Finer than the No. 200 Sieve.
14.	ASTM D1241	Spec. for Materials for Soil-Aggregate Subbase, Base, and Surface Courses.
15.	ASTM D2216	Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil Aggregate Mixtures.
16.	ASTM D2487	Classification of Soils for Engineering Purposes.
17.	ASTM D4318	Test Method for Liquid Limit, Plastic Limit, and Plasticity of Soils.

1.03 QUALITY ASSURANCE

A. No soils and aggregates furnished under this section shall be frozen.

1.04 MATERIAL TESTING

A. Contract with an independent testing laboratory to provide testing services required by this section. Contractor shall be responsible for the cost of all testing required for submittals.

B. To establish acceptability of material, tests shall be performed for each soils class in accordance to the following standards:
   1. Soils Class A and C:
      a. ASTM C88.
      b. ASTM C131 (for coarse aggregates smaller than 1½ inches).
      c. ASTM C136.
      d. ASTM C535 (for coarse aggregates 1½ inches and larger).
      e. ASTM C 117 (use when aggregate contains materials finer than No. 200 sieve).
   2. Soils Class B:
      a. ASTM C88.
      b. ASTM C117.
      c. ASTM C136.
   3. Soils Class D:
      a. ASTM C117.
      b. ASTM C136.
      c. ASTM D1241.
      d. ASTM D2487.
   4. Soils Class E:
      a. ASTM C136 (test when gravel content is present).
      b. ASTM D422.
      c. ASTM D1140.
      d. ASTM D2216.
      e. ASTM D4318
   5. Soils Class F:
      a. ASTM D2487.
   6. Soils Class G:
      a. ASTM D2487.

C. In addition to the above, furnish a soil analysis of Soil Class F:
   1. Analyze for the following:
      a. pH
      b. Phosphorus
      c. Potassium
      d. Soluble Salts
      e. Calcium
      f. Magnesium

D. Source sample all soils and aggregates in accordance with ASTM D75.

E. Perform one (1) acceptable test for each type of material at each source.

1.05 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals.
   1. Test reports.
   2. Soils analysis including recommendations for fertilizer type and application.
   3. Daily delivery tickets with each load.

PART 2 - PRODUCTS

2.01 ENGINEERED SOILS AND AGGREGATES (SOIL CLASS A)

A. General
   1. Material shall be clean, sound, hard, dense, durable, field or quarry stone which is free from seams, cracks, or other structural defects. It shall be angular material from shot rock (blasted) or crushed rock having substantially all face of which have resulted from artificial crushing.
   2. Loss due to sulfate soundness test shall not exceed 10 percent.
   3. Loss due to abrasion test shall not exceed 40 percent.

B. Gradation
   1. Soil Class A-HR (Heavy Rip Rap Rock)

Size of Stone	% Total Wt. Smaller Than the Given Size
500 lbs.	100
400 lbs.	90
150 lbs.	50
40 lbs.	20

   2. Soil Class A-MR (Medium Rip Rap Rock)

Size of Stone	% Total Wt. Smaller Than the Given Size
400 lbs.	100
200 lbs.	90
80 lbs.	50
15 lbs.	20

   3. Soil Class A-LR (Light Rip Rap Rock)

Size of Stone	% Total Wt. Smaller Than the Given Size
150 lbs.	100
60 lbs.	80
20 lbs.	20
2 lbs.	10

   4. Soil Class A-3 (Breaker Run Rock or 6" Crushed Rock)

Sieve Size	% Passing by Weight
7-inch	100
6-inch	90
4-inch	75
3-inch	10

5. Soil Class A-4 (3½-inch Crushed Rock - ASTM D448-No. 1)

Sieve Size	% Passing by Weight
4-inch	100
3½-inch	90-100
2½-inch	25-60
1½-inch	0-15
¾-inch	0-5

6. Soil Class A-5 (2½-inch Crushed Rock - ASTM D448-No.2)

Sieve Size	% Passing by Weight
3-inch	100
2½-inch	90-100
2-inch	35-70
1½-inch	0-15
¾-inch	0-5

7. Soil Class A-6 (1½-inch Crushed Rock - ASTM D448-No. 4)

Sieve Size	% Passing by Weight
2-inch	100
1½-inch	90-100
1-inch	20-55
¾-inch	0-15
3/8-inch	0-5

8. Soil Class A-7 (¾ -inch Crushed Rock - ASTM D448-No. 67)

Sieve Size	% Passing by Weight
1-inch	100
¾-inch	90-100
3/8-inch	20-55
No. 4	0-10
No. 8	0-5

9. Soil Class A-8 (3/8-inch Crushed Rock Chips - ASTM D448-No. 8)

Sieve Size	% Passing by Weight
½-inch	100
3/8-inch	85-100
No. 4	10-30
No. 8	0-10
No. 16	0-5

2.02 ENGINEERED SOILS AND AGGREGATES (SOIL CLASS B)

A. General
1. Shall be hard, strong, durable particles free from seams, cracks, and other structural defects.
2. Rounded to subangular.
3. Free from organic impurities and debris.

B. Gradation
1. Soils Class B-1 (Coarse Aggregate - ASTM C33 - No. 3)

Sieve Size	% Passing by Weight
2½-inch	100
2-inch	90-100
1½-inch	35-70

1-inch	0-15
½-inch	0-5

2. Soil Class B-2 (Coarse Aggregate - ASTM C33 - No. 7)

Sieve Size	% Passing By Weight
¼-inch	100
½-inch	90-100
3/8-inch	40-70
No. 4	0-15
No. 8	0-5

3. Soil Class B-3 (Fine Aggregate - ASTM C33)

Sieve Size	% Passing by Weight
3/8-inch	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10

4. Soil Class B-4 (Torpedo Sand)

Sieve Size	% Passing by Weight
1-inch	100
No. 16	45 to 80
Material Finer Than No. 200	2 to 10

2.03 ENGINEERED SOILS AND AGGREGATES (Soil Class C)

A. General

1. Shall be hard, durable, granular material of uniform quality resulting from crushed rock or crushed bank run sand and gravel.
2. Shall be free from clay lump, organic matter, shale, excess, elongated, or flat pieces, and other deleterious substances.
3. Forty-five percent of the particles retained on a No. 4 sieve shall have at least one fractured face.
4. Wear shall not exceed 50 percent.
5. Loss due to sulfate soundness test shall not exceed 18 percent by weight.
6. Total moisture content shall not exceed 7 percent.
7. Filler for blending shall have a maximum liquid limit of 25 percent and a maximum plasticity index of six.

B. Gradation

1. Soil Class C-1 (Crushed Stone)

Sieve Size	% by Weight Passing
1½-inch	100
3/8-inch	30-65
No. 4	25-55
No. 10	15-40
No. 200	2-12

2. Soil Class C-2 (Crushed Stone)

Sieve Size	% by Weight Passing

1-inch	100
3/8-inch	40-75
No. 4	25-60
No. 10	15-45
No. 200	3-12

3. Soil Class C-3 (Crushed Stone)

Sieve Size	% by Weight Passing
1-inch	100
¾-inch	95-100
3/8-inch	50-90
No. 4	35-70
No. 10	15-55
No. 200	5-15

4. Soil Class C-4 (Crushed Gravel)

Sieve Size	% by Weight Passing
1½-inch	100
1-inch	75-100
3/8-inch	40-75
No. 4	30-60
No. 10	20-45
No. 40	10-30
No. 200	3-10

5. Soil Class C-5 (Crushed Gravel)

Sieve Size	% by Weight Passing
1-inch	100
3/8-inch	50-85
No. 4	35-65
No. 10	25-50
No. 40	10-30
No. 200	3-10

6. Soil Class C-6 (Crushed Gravel)

Sieve Size	% by Weight Passing
1-inch	100
¾-inch	95-100
3/8-inch	50-90
No. 4	35-70
No. 10	20-55
No. 40	10-35
No. 200	8-15

2.04 BANK RUN SOILS

A. Soil Class D-1 and D-2

1. Shall be rounded or subangular material resulting from pit run or crushed material.
2. Shall be free from clay lumps, organic matter, and deleterious substances.
3. One hundred percent by weight shall pass a 3-inch sieve.
4 Maximum liquid limit shall be 25 percent and maximum plasticity index shall be six.
5. The portion of material, which passes a No. 4 sieve, shall conform to the following gradation:

Maximum % by Weight Passing

Sieve Size	Grade D-1	Grade D-2
No. 4	100	100
No. 40	75	---
No. 100	15	30
No. 200	8	15

B. Soil Class D-3 (Sand)

1. Well graded, unwashed bank run or crushed bank run, which is free from clay lumps, organic matter, and other deleterious substances with gradation as follows:

Sieve Size	% Passing by Weight
¼-inch	100
No. 4	90-100
No. 10	45-90
No. 40	15-45
No. 200	0-10

C. Soil Class E-1 (Clay Soil)

1. Minimum 50 percent by weight passing the No. 200 sieve.
2. For the fraction passing the No. 40 sieve, the minimum plasticity index shall be 15.
3. Minimum Atterberg liquid limit of 30.
4. Free from organic material, boulders, cobbles, excessive amounts of gravel (greater than 1/4-inch), and other deleterious substances.

D. Soil Class F-1 (Topsoil)

1. Topsoil shall be defined as the upper soil horizon consisting of mineral layers of maximum humus (organic) accumulation.
2. Topsoil shall:
   a. Have adequate mineral content to support the growth of the vegetation intended to be established.
   b. Have one of the following SCS (Soil Conservation Service) soil textures: loam, sandy loam, silt loam, silty clay loam, or clay loam.
   c. Be free from herbicides, which would be detrimental for the intended use.
   d. Have adequate fertility for quick establishment of vegetation.
   e. Shall be neither excessively acid nor excessively alkaline.
   f. Shall be free from deleterious substances.

E. Soil Class G-1 (Clean Earth Fill)

1. Soil Class G-1 shall be any soil material excavated on the project site or obtained from borrow areas.
2. Soil materials unsuitable and, therefore, not approved for this classification are:
   a. Soils with high organic contents such as: topsoil, peat, muck, organic silts, and clays, marls, etc.
   b. Macadam or rubble filled soils containing such materials as: foundry sand, fly ash cinders, asphalt, and concrete rubble, etc.
   c. Silty soils such as: rock flour, loess, etc.
   d. Soils with gravel larger than 3-inch.
   e. Silty clay or clays with a high plasticity (CH soils as defined in ASTM D2487).
   f. All soil contaminated with hazardous waste materials as defined by the EPA.

F. Soils Class G-2 (Clean Earth Fill)

1. Same as G-1 above except shall not contain gravel larger than 3-inch.

2.05 MANUFACTURED AND SPECIAL SOILS

A. Soil Class J-1 (Agricultural Limestone)
   1. Conform to ASTM C602.
   2. Ground or crushed limestone.
   3. Neutralization index of not less than 40 or more than 109.
   4. Meet the following gradation:
      a. Passing a No. 4 sieve - 100 percent.
      b. Passing a No. 10 sieve - 90 to 100 percent.
      c. Passing a No. 50 sieve - 50 to 100 percent.

B. Soil Class J-2 (Hydrated Lime)
   1. Shall consist of essentially calcium, hydroxide, or a mixture of calcium hydroxide, magnesium oxide, and magnesium hydroxide.
   2. Dry powder obtained by treating quick lime with enough water to satisfy its chemical affinity for water under the conditions of its hydration.
   3. Hydrated lime shall conform to the requirements of ASTM C207, Type N or S.

PART 3 - EXECUTION

3.01 APPLICATION

A. Use the soil classification name as called for in specifications or on drawings.

B. Place material in accordance with the plans and appropriate specification sections for the type of work being performed.

- END OF SECTION -

SECTION 02505

ASPHALTIC CONCRETE PAVEMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes the material requirements for aggregates and bituminous materials for utilization in binder and surface course pavements for light and medium duty streets and parking lots.

1.02 REFERENCE STANDARDS

A. American Society of Testing and Materials (ASTM)

B. American Association of State Highway Officials (AASHTO)

C. Federal Aviation Agency (FAA)

D. Asphalt Institute (AI)

E. Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction. (Latest Edition).

1.03 SUBMITTALS

A. Submit two (2) copies of test results of quality control testing including:
   1. Materials source testing.
   2. Asphaltic concrete pavement installation testing.
   3. Additional testing.

B. Submit one (1) copy of daily weight tickets showing the net weight for each truckload of pavement delivered and placed.

C. The quantity of asphaltic concrete pavement placed shall be confirmed using theoretical tonnage. Tonnage shall be based on the square yards placed at 110# per square yard per inch. Tonnage shall not deviate greater than 10 percent from the theoretical tonnage.

1.04 STORAGE AND DELIVERY

A. Stockpile aggregate to prevent excessive segregation.

B. Storage period for hot mix shall not exceed 2 hours.

C. Store asphalt cement in tanks free of foreign substances and caked asphalt.

PART 2 - PRODUCTS

2.01 AGGREGATE

A. Aggregate shall conform to Wis. DOT Standard Specifications for Highway and Structures Construction, Sections 450 and 460 (latest edition).

2.02 MINERAL FILLER

A. Mineral filler shall conform to Wis. DOT Standard Specifications for Highway and Structures Construction, Section 450.

2.03 ASPHALT MATERIALS

A. Conform to Wis. DOT Standard Specifications for Highway and Structures Construction, Section 455.

2.04 TACK COAT

A. Tack coat shall conform to Wis. DOT Standard Specifications for Highway and Structures Construction, Section 455.

2.05 ASPHALT MIX

A. Asphaltic mix shall be Type E-1, pg 58-28 and conform to Wis. DOT Standard Specifications for Highway and Structures Construction, Sections 450 and 460 (Latest Edition).

2.06 EQUIPMENT

A. All equipment shall conform to Wis. DOT Standard Specifications for Highway and Structures Construction, Section 450 (Latest Edition).

B. Trucks shall be covered and insulated adequately to provide a mix temperature of 250° F (121°C) at point of delivery.

PART 3 - EXECUTION

3.01 EQUIPMENT REQUIREMENTS

A. Mixing plants shall conform to AASHTO M156.

B. Bituminous paver shall have following features.
1. Hopper distribution system.
2. Screed assembly shall be capable of heating and adjusting to slope and elevation.
3. Paver shall produce an even finished surface with a smooth, dense texture.

C. Roller shall be in accordance to following:
1. Designed specifically for bituminous compaction.
2. Vibratory with adjustable frequency and amplitude.
3. Compression: 250 pounds per inch of width of drive rollers.

4. Provide device to moisture, and clean rollers

D. Trucks shall be covered and insulated adequately to provide a mix temperature of 250° F (121°C) at point of delivery.

3.02 SURFACE PREPARATION

A. Prepare compacted foundation in accordance with Section 02235, Crushed Aggregate Base Course.

B. Remove loose concrete and protruding joint material.

C. Clean surface joints.

D. Control weeds with herbicide in accordance with state and local regulations.

E. Adjust sanitary and storm manholes to finished pavement grade.

F. Adjust valve boxes to finished pavement grade

G. Fill potholes and depressions with a leveling course of asphaltic mix and compact to required density.

H. Tack coat shall be applied to all abutting concrete or asphalt surfaces and new bituminous surfaces which have been driven on or became contaminated.

I. Remove all joint sealant prior to placement of any new bituminous pavement material.

3.03 BITUMINOUS PAVEMENT PLACEMENT

A. Place to thickness, grade and section shown on plan.
   1. When thickness is not shown on plans, pavement thickness shall be 3 inches compacted.
      a. 1¾-inch binder course, Gradation Nominal aggregate size 3/4-inch (19 mm).
      b. 1¼-inch surface course, Gradation aggregate size 1/2-inch (12.5 mm).
   2. Course thickness shall be achieved by placing single or multiple layers of bituminous to the following tolerances:
      a. Minimum thickness: two times the largest aggregate when compacted.
      b. Maximum thickness: 2¼ inches compacted

B. Hand Spreading
   1. Will be permitted only in areas inaccessible to finishing machines.
   2. Place by means of a shovel and shape with rake or lute.
   3. Do not rake over machine spread surfaces.

C. Compaction
   1. Roll as soon as mixture will support roller without displacing pavement mat.
      a. Initial pass shall be with drive roller toward paver.
      b. Start at lower unsupported edge and progress toward other edge.
      c. Overlap successive trips.
   2. Subsequent strips laid; start adjacent to previous laid strip and continue to opposite edge.

3. Roll until:
   a. Roller marks are minimized or eliminated.
   b. Surface is of uniform density.
   c. Required density is obtained.

D. Bonding Joints
1. Clean all joints.
2. Joining new bituminous to existing bituminous:
   a. Saw cut all joints and tack coat.
3. Joining new bituminous to new bituminous
   a. Saw cut end joint if it has been over 12 hours since the other "new" pavement had been placed.
   b. Tack coat all cold joints.
   c. Tack coat all cold surfaces.

E. Bonding Surfaces
1. Tack all existing and new bituminous surfaces.
2. Tack all abutting concrete or asphalt surfaces.
3. Application rate shall be one-tenth (1/10) gallon per square yard.

3.04 PAVING RESTRICTIONS

A. Do not place bituminous pavement when following conditions exist.
1. Unstable or frozen base.
2. During rain or snow.
3. When air temperature is less than 35°F (1.50°C).

3.05 SURFACE REQUIREMENTS

A. Surface shall be dense and to a true plane of 1/8 inch in 10 feet.

B. Bituminous shall be replaced when the following conditions exist.
1. Pavement has raveling, rutting, or will not set up to receive traffic.
2. At a minimum replacement shall be a full lane width, patching will not be permitted.
3. All joints will be saw cut and tack coated.

3.06 SHOULDERING

A. Shoulder all portions of the street where curb and gutter is not required.

B. Unless shown otherwise, shoulders shall be three (3) feet wide.

C. If the finish bituminous course is not placed immediately after the binder course, shouldering shall be completed in multiple lifts, one lift after each course.

D. Conform with Section 02235, Base Course.

3.07 SPECIFIED DENSITY PROCEDURE (TYPE E-1 OR TYPE E-3)

A. Laboratory density is that which is obtained when samples of the mix from the applicable course is compacted and its weight determined in accordance with W.D.O.T. Test Method 1559, "Superpave Method of Mix Design" for each pavement mix.

B. Ordinary Compaction Method
   1. Course
      a. Leveling
      b. Wedging
      c. Patching
   2. Degree of Compaction
      a. Compact to the degree that no further appreciable consolidation is evidenced under the action of the compaction equipment

C. Laboratory Method
   1. Degree of Compaction
      a. Binder course on existing paved surface: 89.5% of laboratory density.
      b. Binder course on crushed aggregate base course: 89.5% of laboratory density.
      c. Surface course: 91.5% of laboratory density.
   2. Acceptance Testing
      a. Perform one (1) density test per 350 square yards per lift or every 100 lineal feet of roadway in accordance with ASTM D2950.
   3. Laboratory density is that which is obtained when samples of the mix from the applicable course is compacted and its weight determined in accordance with ASTM D1559.

D. The Contractor shall secure the services of an established independent testing laboratory to perform all testing.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT AND PAYMENT

A. Work under this section shall be incidental to the project or paid for as shown in the bid schedule.

B. Measurement and Payment
   1. Square yards shall be computed by measuring the area of bituminous pavement compacted in place.
   2. Payment will be made by the square yard compacted in place.
   3. Payment shall include:
      a. Hauling and placing
      b. Compaction
      c. Tack
      d. Site restoration
      e. Testing

C. Density Deficiency
   1. Density shall be measured by averaging the nuclear density test required for a day's production placed.

2. Should the average density fall below specified densities, the Owner may accept the deficient work in accordance with the terms of Section 00700, Standard General Conditions of the Construction Contract. Payment will be made at an adjusted price as specified in the following table:

PERCENT DENSITY BELOW SPECIFIED MINIMUM	PAYMENT FACTOR (PERCENT OF CONTRACT PRICE)
From 0.5 to 1.0 inclusive	98
From 1.1 to 1.5 inclusive	95
From 1.6 to 2.0 inclusive	91
From 2.1 to 2.5 inclusive	85
From 2.6 to 3.0 inclusive	70

3. If the specified density deficiency is greater than 3%, the material shall be removed and replaced with a mixture to the specified density and, when acceptably replaced, will be paid for at the contract unit price.

D. Thickness Deficiency

1. Thickness deficiency shall be verified using theoretical tonnage. If the in place tonnage is greater than 10 percent below the theoretical tonnage the following shall apply.

   a. Thickness shall be measured by averaging four (4) samples taken after the final course has been compacted in place.

   b. The unit price per square yard will be computed proportional to the average thickness of four cores as follows:

Deficiency in Thickness Determined By:	
Cores in Inches	Percent of Unit Price Allowed
0.00 to 0.125	100%
0.126 to 0.25	85%
0.251 to 0.375	70%
0.376 to 0.50	55%

   c. If the thickness deficiency is greater than 0.50 inches, no payment will be made until the Contractor corrects the deficiency with additional courses (minimum ¾ inches compacted per course).

- END OF SECTION -

SECTION 02600

BURIED PIPING AND APPURTENANCES

PART 1 – GENERAL

1.01 SUMMARY

A. Related Sections and Divisions:
1. Applicable provisions of the General conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Section 01563, Erosion Control.
4. Section 02050, Demolition.
5. Section 02052, Abandonment and Grouting Existing Pipelines.
6. Section 02220, Trenching, Backfilling and Compaction.
7. Section 02616, Ductile Iron Pipe.
8. Section 02622, PVC Pipe.
9. Section 02623, Polyethelene Pipe.
10. Section 02624, PVC Lined R.C.P. Sewer.
11. Section 02625, Centrifugally Cast Fiberglass Mortar Pipe.
12. Section 02660, Watermain.
13. Section 02720, Storm Sewer.
14. Section 02730, Sanitary Sewer.

1.02 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300, Submittals:
1. General arrangement drawings of 3-inch or larger piping shall be submitted to Engineer for approval. Drawings shall include proposed length, location and elevation of pipe, fittings, valves and appurtenances.

PART 2 – PRODUCTS

2.01 MATERIALS OF CONSTRUCTION

A. Size and Type:
1. All materials shall conform to the size and type shown on the drawings or called for in the specifications.
2. In joining two dissimilar types of pipe, standard fittings shall be used when available. In the event standard fittings are not available, the method of joining shall be standard selected by Contractor and submitted for review and approval by Engineer.

B. Piping appurtenances shall be made of the materials specified. All appurtenances not designated as to type shall be selected by Contractor and submitted for review and approval by Engineer.

2.02 STEEL CASING PIPE

A. Minimum yield strength of 35,000 psi.

B. Minimum wall thickness for E72 loading:

Nominal Diameter (inches)	Nominal Thickness (inches)
Less than 14	0.188
14-16	0.219
18	0.250
20	0.281
24	0.344
26	0.375
30	0.406
36	0.469
42	0.500

C. Increase casing wall thickness a minimum of 0.060 inches if installed without a protective coating.

2.03 CASING SPACERS

A. Casing spacers shall be as manufactured by Cascade Waterworks Manufacturing or equal and conform to the following:
1. Spacers shall be bolt on style with a shell made in two sections of minimum 14 gauge T-304 stainless steel and shall be PVC lined with a minimum thickness of 0.90 inches with 85-90 durometer.
2. Nuts and bolts shall be 18-8 stainless steel.
3. Runners shall be made of ultra high molecular weight polymer with high abrasion resistance and a low coefficient of friction.
4. Runners shall be supported by risers made of minimum 14 gauge T-304 stainless steel, MIG welded to the shell and all welds shall be passivated.
5. Height of supports and runners combined shall be sufficient to keep the carrier pipe at least 2 inches clear of the casing pipe wall at all times.
6. The spacers shall have restraining style positioning.

B. The following carrier/casing size shall be used for PVC, C900 and ductile iron pipe. Verify Carrier size with Engineer for concrete pipe.

4-inch Carrier into 10-inch casing
6-inch Carrier into 12-inch casing
8-inch Carrier into 14-inch casing
10-inch Carrier into 16-inch casing
12-inch Carrier into 20-inch casing
14-inch Carrier into 24-inch casing
16-inch Carrier into 24-inch casing
18-inch Carrier into 30-inch Casing
20-inch Carrier into 30-inch Casing
24-inch Carrier into 36-inch Casing
30-inch Carrier into 42-inch Casing
36-inch Carrier into 48-inch Casing
42-inch Carrier into 54-inch Casing

2.04 CONCRETE

A. All concrete work under this Contract, unless shown or specified otherwise, shall conform to the requirements of Division 3.

PART 3 – INSTALLATION

3.01 INSTALLATION

A. Pipe bedding shall be in accordance with the standard details shown in the drawings.

B. Thrust blocking shall be in accordance with the standard details shown in the drawings.

3.02 BORING AND JACKING CASING PIPE

A. Install casing pipe to the limits and elevation which will allow the carrier pipe to be installed to the required line and grade.

B. Fit the carrier pipe with casing spacers which shall:
1. Allow grade adjustments.
2. Prevent floating and buckling of the carrier pipe.
3. Provide a low friction coefficient so the carrier pipe can be slid into place without splitting bells.

C. Fill annular space between casing and carrier pipe with sand, pea gravel or fly ash slurry.

3.03 CASING SPACER INSTALLATION

A. Place size and type of spacer as follows:

Type of Pipe	Carrier Pipe Size	Maximum Spacer Interval	Length of Spacer	Spacer Type
Ductile Iron, Steel, Asbestos Cement and PVC C-900	Up to 24 Inches	10 Foot	8 Inch	Restrained
Ductile Iron Steel, Asbestos Cement and PVC C-900	24-inch to 48-inch	6 Foot	12 Inch	Restrained
PVC SDR-35, PVC Schedule 40 and PVC Schedule 80	All Sizes	6 Foot	8 Inch	Restrained

B. At a minimum, provide spacers at each side of each pipe joint and the center of each pipe.

3.04 FIELD QUALITY CONTROL

A. Contractor shall include the cost of all testing, cleaning and disinfection in the bid.

B. All work shall be inspected, tested, and approved in accordance with federal, state and local rules and regulations. All work shall also be tested as specified in this section. Unless indicated in writing before testing begins, all tests shall be witnessed by Engineer and others as necessary. Test results shall be recorded and reports or appropriate certificates shall be submitted to Engineer in triplicate.

C. All new piping shall be tested. All underground piping shall be backfilled or properly secured to avoid damage during testing. Should underground piping fail test, Contractor shall be responsible for removal and replacement of backfill. All piping, interior or exposed, shall be subject to test before being covered with insulation, or paint. All piping and appurtenances shall be watertight or airtight and free from visible leaks.

D. All piping shall be flushed or blown out after installation prior to testing. Contractor shall provide all necessary piping connections, water, air, test pumping equipment, water meter, bulkheads, valves, pressure gauge and other equipment, materials and facilities necessary to complete the specified tests. Contractor shall provide all temporary sectionalizing devices and vents for testing.

E. Pressure tests shall be performed in accordance with Section 01661, Testing and Inspection of Pipeline Construction.

3.05 CLEANING AND DISINFECTION

A. All equipment and materials shall be clean before installation. Contractor shall disinfect and flush the potable water system before it is put online. Watermain shall be disinfected according to AWWA C651.

3.06 REPAIR AND RESTORATION

A. Unless otherwise specified, Contractor shall replace all bituminous and concrete pavement removed or damaged during performance of the work. Concrete pavement replacement shall conform to Division 3. Bituminous pavement replacement shall conform to Division 2.

B. Clean-up:
1. Upon completion of the work, all improvements disturbed by Contractor's operations shall be repaired or replaced. Broken concrete, rubble fill, and other excess material shall be removed from the site and wasted.
2. All areas for the storage of materials or the temporary deposit of excavated earth shall be leveled off and cleaned up. All surplus material, tools, and equipment shall be removed, and the premises shall be left free of everything of the kind.
3. All pipes and manholes shall be flushed until clean and all debris and mud shall be removed.

3.07 CLEANING OF WORK

A. Pipelines
1. Interiors of all pipelines (including existing) affected by construction procedures shall be free of all extraneous materials.
2. Pipelines shall be left clean at the completion of work.

B. Final Clean up and Inspection
1. Contractor shall remove all of the following:
   a. Temporary offices and storage structures.
   b. Temporary fencing and roads.
   c. Surplus material and rubbish.
   d. Material (liquid or solid) resulting from cleaning operations.
2. The Engineer and Owner may make final inspection of the work during the progress of the final cleaning and repairing. Any portion of the work accepted by the Owner shall be kept clean by the Contractor until final acceptance of the entire project.
3. When the contractor has completed the final cleaning operation, he shall notify the Engineer in writing that he is ready for final inspection.
4. After written notification to the Contractor, the owner may elect to remove from the work site and/or adjacent properties, all rubbish, surplus or waste materials which the

contractor has neglected or refused to remove, and deduct the costs of removal from any monies due the contractor.

3.08 DEMOLITION

A. All exterior piping removals, including manholes and appurtenances and abandonment, shall be by Contractor. The locations and elevations of existing piping are approximate. Where necessary, existing piping shall be exposed prior to installing new piping. Any changes in pipe location or elevation shall be approved by Engineer.

B. Contractor shall remove or abandon all existing piping and appurtenances as noted. Unless otherwise shown or specified, the owner shall have the right of first refusal for all, piping and appurtenances to be removed shall be removed from the site for salvage or disposal. Unless otherwise shown or specified, piping shown or specified to be abandoned shall be filled with a 3' concrete plug. Concrete shall be as specified in Division 3. Wherever excavations cross piping to be abandoned, piping shall be removed to the limits of the excavation and the ends shall be filled as specified above.

C. Valve boxes and exposed valves and operators on piping to be abandoned shall be removed. All concrete surfaces to remain shall be patched as required to provide a smooth surface. Re-piping and connections to new piping shall be as specified for new piping.

D. It is the responsibility of the Contractor to remove or abandon all piping and appurtenances, as shown or specified, and patch all holes resulting therefrom unless specified or shown otherwise. The intent of these specifications is to require that the removal of materials, patching of all existing holes and repiping be done in a workmanline manner. All costs shall be included in the bid.

-- END OF SECTION --

SECTION 02616

DUCTILE IRON PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included: This section includes material and performance requirements for ductile iron pipe and fittings.

B. Related Sections and Divisions:
1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Section 01661, Testing and Inspection of Pipeline Construction.
4. Section 02220, Trenching, Backfilling and Compaction.
5. Section 02565, Forcemain.
6. Section 02600, Buried Piping and Appurtenances.
7. Section 02660, Watermain.

1.02 REFERENCE STANDARDS

A. American Water Works Association (AWWA):

1.	AWWA C104	Cement-Mortar Lining for Cast Iron and Ductile Iron Pipe and Fittings for Water
2.	AWWA C110	Gray Iron and Ductile Iron Fittings, 3-in. through 48-in. for Water and Other Liquids
3.	AWWA C111	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
4.	AWWA C115	Flanged Ductile-Iron Pipe with Threaded Flanges
5.	AWWA C150	Thickness Design of Ductile-Iron Pipe
6.	AWWA C151	Ductile-Iron Pipe, Centrifugally Cast for Water or Other Liquids
7.	AWWA C153	Ductile-Iron Compact Fittings 30-in. through 16-in., for Water and Other Liquids
8.	AWWA C600	Installation of Ductile-Iron Watermains and their Appurtenances

1.03 MARKING, HANDLING AND STORAGE

A. Marking
1. Conform with AWWA C151.
2. Markings shall include:
   a. Weight.
   b. Class or thickness.
   c. Manufacturer's mark.
   d. Where casted.
   e. Year produced.

B. Handling and Storage
1. Conform with AWWA C600.
   a. Pad lifting equipment to prevent damage to exterior coatings.
   b. Do not drop, skid, or roll pipe.
   c. Store so pipe remains free of dirt and foreign material.

d. Any significant damage to coatings shall be repaired before installation.
e. Under no circumstances shall pipe or fittings be dropped into the trench or so handled to receive hard blows or jolts.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals:
1. Submit manufacturer's certification that materials delivered comply with the requirements of this section.

PART 2-PRODUCTS

2.01 PIPE

A. Conform with AWWA C150 and C151.
1. All pipe shall be the product of one manufacturer.

B. Coating and Lining:
1. Exterior Coating: Asphaltic coating, minimum of 1 mil thick.
2. Interior Lining: Standard thickness of cement-mortar conforming with AWWA C104.

C. Pipe Class and Rating for Push-on, Push-on Lock Joint, and Mechanical Joint:
1. 3-inch through 24-inch:
a. Class 52.
b. Rated pressure 350 psi.

D. Pipe Class and Rating for Flanged Joint Pipe:
1. Class 53 minimum.
2. Rated pressure 250 psi.

2.02 PIPE JOINTS

A. Push-on:
1. Conform with AWWA C111.
2. Gaskets
a. Plain rubber for sewer and water to temperatures not exceeding 150°F.
b. For air piping, gaskets shall be rated for a minimum of 248°F.

B. Push-on Lock Joint:
1. Conform with AWWA C111.
2. Joints shall be held in place with a boltless locking ring.
3. Gaskets: Plain
a. Plain rubber for sewer and water to temperatures not exceeding 150°F.
b. For air piping, gaskets shall be rated for a minimum of 240°F.

C. Mechanical Joint:
1. Conform with AWWA C111.
2. Joints shall include:
a. Ductile or gray iron follower gland.
b. T-bolts shall be Type 304 or 316 stainless steel. All stainless steel threads shall be coated with anti-sieze compound prior to assembly.

c. Plain rubber gasket for sewer and water to temperatures not exceeding 150°F.
d. Joint restraints shall be MEG-A-LUG by EBBA Iron.

D. Flange Joint:
1. Conform with AWWA C115.
2. Joints shall include:
a. Ductile iron flanges.
b. Bolts with nuts.
c. Sheet rubber gaskets, full face, minimum 1/8 inch thick.
d. For air piping, gaskets shall be rated for a minimum of 240°F.

E. Grooved Joint:
1. Conform with AWWA C-606.
2. Joints shall include:
a. Couplings.
b. Transition couplings when needed.
c. Gaskets & bolts.
d. For air piping, gaskets shall be rated for a minimum of 240°F.
e. Transition couplings when needed.

2.03 PIPE JOINT RESTRICTIONS

A. The use of lead or asbestos in the gasket material is prohibited.

2.04 FITTINGS

A. All fittings shall be the product of one manufacturer.

B. For use below grade:
1. Compact ductile iron mechanical joint conforming to AWWA C153.

C. For use within manholes, structures or above grade:
1. Standard gray iron or ductile iron flanged joint conforming to AWWA C110.

D. For use within structures:
1. Ductile iron grooved joint conform with AWWA C-606.

E. Coatings and Linings
1. Exterior Coating: Asphaltic coating, minimum of 1 mil thick.
2. Interior Lining: Standard thickness of cement-mortar conforming with AWWA C104.

F. Gaskets: Conform with AWWA C111.

2.05 POLYETHYLENE ENCASEMENT

A. General Requirements
1. Meet AWWA C105.
2. Type: 1
3. Class: "C" (black).
4. Grade: "E-1"

5. Thickness: 8 mils/layer

PART 3 - EXECUTION

3.01 POLYETHYLENE ENCASEMENT

A. All underground ductile iron pipe, valves, valve boxes and fittings shall be polyethylene encased.

3.02 APPLICATION

A. Install piping in accordance with the plans and appropriate specification sections for the type of work being performed.

3.03 CLEANING AND PROTECTION OF PIPE

A. The interior and exterior of all pipe shall be clean and free from all foreign material before being installed. The Contractor shall provide the necessary means to wipe, brush, swab, or air blast to remove any foreign material from the interior of the pipe as required by the Engineer.

B. Every precaution shall be taken to prevent foreign materials from entering the pipe while it is being placed in the line. If the pipe-laying crew cannot put the pipe into the trench and in place without getting earth into it, the Engineer may require that before lowering they pipe into the trench, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the connection is to be made to the adjacent pipe. During the laying operations, no debris, tools, clothing, or other materials shall be placed in the pipe.

C. At all times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means accepted by the Engineer. This provision shall apply during the noon hour as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry. No pipe shall be laid in water or when trench conditions are unsuitable.

3.04 ACCEPTANCE TEST

A. General
All pipelines and sewers shall be tested. Test pressure, duration, and media shall be as specified in the piping system specification sheets. Care should be exercised to isolate equipment not rated for the specified test pressure to avoid damage to the equipment.

B. All pipe shall be tested in accordance with Section 01661, Testing and Inspection of Pipeline Construction.

- END OF SECTION -

SECTION 02622

PVC PLASTIC PIPE

PART 1 - GENERAL

1.01 SUMMARY

A. Work included: This section includes material and performance requirements for (polyvinyl chloride) plastic pipe and fittings.

B. Related Section and Divisions:
1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Section 01661, Testing and Inspection of Pipeline Construction.
4. Section 02220, Trenching, Backfilling and Compaction.
5. Section 02600, Buried Piping and Appurtenances.
6. Section 02660, Water main.
7. Section 02720, Storm Sewer and Drainage.
8. Section 02730, Sanitary Sewer.
9. Section 15050, Methods and Materials For Piping Installations.

1.02 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1.	ASTM D1784	Spec. for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
2.	ASTM D1785	Spec. for Poly (Vinyl Chloride) (PVC) Plastic Pipe Schedules 40, 80, and 120.
3.	ASTM D2241	Spec. for Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR).
4.	ASTM D2412	Test for External Loading Properties of Plastic Pipe by Parallel-Plate Loading.
5.	ASTM D2466	Spec. for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
6.	ASTM D2467	Spec. for Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
7.	ASTM D2837	Standard Test Method for Obtaining Hydrostatic Design Basics for Thermoplastic Pipe Materials.
8.	ASTM D2855	Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
9.	ASTM D3034	Spec. for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
10.	ASTM D3139	Spec. for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
11.	ASTM D3212	Spec. for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
12.	ASTM F438	Spec. for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40.
13.	ASTM 439	Spec. for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.

14. ASTM F441 Spec. for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Schedules 40 and 80.
15. ASTM F477 Spec. for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
16. ASTM F679 Spec. for Poly (Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings.

B. American Water Works Association (AWWA):
1. AWWA C900 Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4-inch through 12-inch for water.
2. AWWA C905 Standard for Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameters 14-inch through 36-inch.

1.03 QUALITY ASSURANCE

A. Pipe shall be available to Owner's Representative for inspection.

B. Pipe shall be considered defective and will be rejected when:
1. Pitted or cratered.
2. Flaking.
3. Straightness varies more than ½-inch in 10 feet.
4. Any defect that prevents assembly according to manufacturer's recommendations.

C. Material brands and/or pipe classes shall not be mixed.

1.04 PRODUCT DELIVERY

A. Pipe Marking - pipe shall be marked as follows:
1. Manufacturer's name, trademark, or logo.
2. Nominal size.
3. PVC minimum cell classification.
4. Pipe stiffness designation, dimension ratio or schedule size and pressure class.
5. ASTM or AWWA designation.
6. National Sanitation Foundation approval (pipe for potable water).
7. Production date.

B. Storage:
1. Provide a covered storage area.
2. Keep pipe material safe from damage and theft.
3. Protect pipe material from direct rays of the sun.
4. Protect gaskets from sun rays, excessive heat, grease, oil, and electric motors that produce ozone.

1.05 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals:
1. Certification of production date of all materials.
2. Manufacturer's certification that materials delivered comply with requirements of this section.

PART 2 - PRODUCTS

2.01 NON-PRESSURE RATED PIPE

A. Gravity Sewer
1. All pipe shall be the product of one manufacturer.
2. All fittings shall be the product of one manufacturer.
3. Pipe shall be manufactured in accordance with the following standards:
   a. Sizes 8-inch through 15-inch: ASTM D3034.
   b. Sizes 18-inch through 27-inch: ASTM F679 or ASTM F794.
4. Elastomeric Gaskets: Conform with F477
5. Fittings and repair couplings shall be the same class and physical properties as pipe and monolithically molded or extruded.
6. Solvent welded and stainless steel strapped wyes or tees may be used for storm sewer laterals: conform to ASTM D3034 and ASTM F679.
7. Elastomeric Joints: ASTM D3212
8. Solvent Weld Joints: Not permitted.

B. Sewer Services
1. Conform with ASTM D1784 and D1785.
2. Pipe sizes 4-inch and 6-inch: Schedule 40
3. Solvent Weld Joints: ASTM D2855
4. Fittings: Socket type, ASTM D2466

C. Piping System Specification (Section 15050)
1. Conform with ASTM D1784 and D1785.
2. Solvent Weld Joints: ASTM D2855.
3. Threaded Joints: ASTM D2464-06.
4. Fittings: Socket Type, ASTM D2466.

2.02 PRESSURE RATED PIPE

A. Water main
1. All pipe shall be the product of one manufacturer.
2. All fittings shall be the product of one manufacturer.
3. Pipe shall be manufactured in accordance with the following standards:
   a. Pipe sizes 4-inch through 12-inch: AWWA C900, pressure Class 150, thickness Class DR 18.
   b. Pipe sizes 14-inch through 36-inch: AWWA C905, pressure Class 235, thickness Class DR18.
4. Elastomeric gaskets shall be manufactured as defined in ASTM F477.
5. Joints shall conform to ASTM D3139.
6. Solvent weld joints may not be used.

B. Pressure Sewer (3 Inches and Smaller)
1. Pipe and joints shall be manufactured in ASTM D2241, minimum pressure Class 160 and thickness Class SDR 26.
2. Solvent Weld Joints: ASTM 2855

C. Pressure Sewer (4 Inches and Larger)

1. Pipe and joints shall meet one of the following minimums:
   a. Pipe sizes 4-inch through 12-inch:
      1) AWWA C900, pressure Class 150, thickness Class DR 18.
      2) ASTM D2241, pressure Class 250, thickness Class SDR 17.
   b. Pipe sizes 14-inch through 36-inch: AWWA C905, pressure Class 150, thickness Class DR 18.
2. Elastomeric Joints: ASTM D3139
3. Piping Systems (Plant Piping)

2.03 RESTRAINED JOINT PVC PIPE

A. Water Main or Sanitary Sewer.
   1. Acceptable manufacturer is Certanteed Certa-Lok C900/RJ PVC pipe or equal.
   2. Pipe shall be manufactured in accordance with the following standards:
      a. Pipe sizes 4-inch through 12-inch: AWWA C900, pressure Class 235, thickness Class DR 18 in right-of-way or easements (non-traffic areas).
      b. Pipe sizes 4-inch through 12-inch: AWWA C900, pressure class 305, thickness Class DR 14 in traffic areas.
   3. Restrained Joint Couplings
      a. Non-metallic restrained type couplings. Pipe and couplings shall be designed as an integral system and shall be provided by a single manufacturer for maximum reliability and interchangeability. Pipe and couplings shall be joined using high-strength flexible plastic splines inserted into mating precision-machined grooves, which align when the pipe is fully inserted provided a full 360° restraint with evenly distributed loading. No external pipe-to-pipe restraining devices that clamp onto or otherwise damage the pipe surface as a result of point loading shall be permitted.

PART 3 - EXECUTION

3.01 PVC INSTALLATION

A. Install PVC piping in accordance with manufacturer's written instructions.

B. Refer to applicable section for installation procedures.

- END OF SECTION -

SECTION 02660

WATER MAIN

PART 1 -GENERAL

1.01 SUMMARY

A. Work Included: This section includes water main installation, materials, and restoration.

B. Related Sections and Divisions:
1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Section 01563, Erosion Control.
4. Section 01661, Testing and Inspection of Pipeline Construction.
5. Section 02220, Trenching, Backfilling and Compaction.
6. Section 02290, Soils and Aggregates.
7. Section 02600, Buried Piping and Appurtenances
8. Section 02616, Ductile Iron Pipe.
9. Section 02622, PVC Plastic Pipe.
10. Section 02623, Polyethylene Pipe.
11. Section 02936, Landscaping.

1.02 REFERENCE STANDARDS

A. American Water Works Association (AWWA).

B. American Society for Testing and Materials (ASTM).

C. American Society of State Highway and Transportation Officials (ASSHTO).

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals including the following:
1. Product literature and catalog cut sheets of materials to be supplied that relate to these specifications.
2. One copy of all test reports.

PART 2 - PRODUCTS

2.01 PIPE MATERIAL

A. Ductile Iron Pipe shall conform to Section 02616, Ductile Iron Pipe.

B. PVC Pipe shall conform to Section 02622, PVC Plastic Pipe.

C. Polyethylene pipe shall conform to Section 02623, Polyethylene Pipe.

2.02 HYDRANTS

A. Manufacturer: Clow Model 2500, Kennedy Guardian K81A, or Mueller Centurian, or equal, conforming to AWWA C502.

B. Hydrants shall have 5¼-inch main valve opening, 6-inch mechanical joint connection, standard pentagon operating nut, two 2½-inch hose connections, and one 4½-inch pumper connection.

C. Hydrants shall be provided with O-ring seals and compression type shut off.

D. All buried bolts on the hydrant body shall be Type 304 stainless steel. All stainless steel threads shall be coated with anti-seize compound prior to assembly.

E. Depth of Bury shall be as required to conform to the hydrant flange elevations as shown on plans or a 7.5-foot minimum measured from the bottom of inlet to the hydrant ground line. No additional compensation will be allowed for hydrant extensions if required.

F. Color shall be red body with yellow top.

G. Equip hydrants with a break-away safety flange and coupling at the ground line.

2.03 VALVES

A. Resilient Gate Valve
1. Manufacturer shall be Clow—R.W., Kennedy—R.W., M&H—R.S.C.V., Mueller—R.W., or Waterous—500, or equal.
2. Resilient encapsulating wedge valve shall be used in water main sizes 4-inch through 12-inch.
3. Valves shall conform with AWWA C515.
4. Stem shall be non-rising.
5. Valve body and bonnet shall be epoxy coated inside and out, conforming to AWWA C550. All bonnet bolts shall be Type 304 stainless steel. All stainless steel threads shall be coated with anti-seize compound prior to assembly.
6. Waterway shall be smooth with no cavities or depressions in seat area.

B. Butterfly Valves
1. Manufacturer shall be Clow, Dressure, Mueller, or Pratt, or equal.
2. Butterfly valve shall be used in water main 14 inches and larger.
3. Conform with AWWA C504, Class 150-B.
4. Valve shaft shall be stainless steel.
5. Valve disc shall be ductile iron.
6. All buried bolts on the valve body and operator shall be Type 304 stainless steel.

C. Valve Boxes
1. Manufacturer shall be Clow, Tyler, Sigma, or equal.
2. Valve boxes shall be cast iron, three-piece, screw-type – Cast Iron.
3. Shaft shall be 5¼-inch diameter.
4. Lid shall be diameter drop type, anti-rattle and marked "Water."
5. Base shall be round or oval, sized to fit valve.
6. Provide Valve box hangers, Adaptor Inc., or equal.

D. Valve Box Hangers: Manufacturer shall be Adaptor Inc. or equal.

2.04 FITTINGS

A. Conform with AWWA C150 and C151.
   1. All fittings shall be the product of one manufacturer

B. Mechanical Joint 3-inch through 24-inch:
   1. Class 52.
   2. Rated Pressure 350 psi.

C. Coating and Lining:
   1. Exterior Coating: Asphaltic Coating, minimum of 1-mil. thick.
   2. Interior Lining: Standard thickness of cement-mortar conforming with AWWA C104.

2.05 POLYETHYLENE ENCASEMENT

A. Polyethylene encasement shall conform with AWWA C105.

B. Polyethylene encasement shall be Class C Black, Type 1 and Grade E-1.

C. Thickness shall be 8 mils minimum/layer.

2.06 WATER SERVICE MATERIAL

A. Copper Tubing
   1. Type "K" conforming with AWWA C800.

B. Corporation Stops
   1. Manufacturer shall be Mueller H-15008, McDonald 4701 Q, or equal.
   2. Corporation stops shall conform with AWWA C800.
   3. Inlet shall have AWWA standard thread.
   4. Outlet shall be compression.

C. Curb Stops
   1. Manufacturer shall be Mueller B-25155, McDonald 6104 Q, or equal.
   2. Curb stops shall conform with AWWA C800.
   3. Inlet and outlet shall be compression.

D. Curb Boxes
   1. Curb boxes shall be Mueller H-10300 or McDonald 5614 for ½ to 1-inch curb stops, H-10302 or McDonald 5614 for 1¼-inch, and H-10300 or McDonald 5615 for 1½-inch and 2-inch curb stops or equal.
   2. Minneapolis pattern with 1¼-inch upper section.
   3. Lid shall be plug style with pentagon bolt and marked "WATER."
   4. The curb boxes shall extend 7 feet and be complete with stainless steel stationary rods and stainless steel pin.
   5. Base size shall match curb stop size.

6. Two curb box keys and wrenches per contract or one per thirty curb boxes, whichever number is greater.

E. Service Saddles
1. Manufacturer shall be Romac 306, Smith Blair 372, Cascade CSC2, or equal.
2. Service saddles shall be used when tapping PVC water main.

F. Fittings
1. Fittings for copper water service piping shall be of cast brass having an alloy of 85% copper, 5% zinc, and 5% lead.
2. Fittings shall have a uniform wall thickness and strength, and shall be free of defects, which may affect their serviceability.
3. Fittings shall be of the flared and compression type only.
4. Unions shall be extra heavy 3-part type.

2.07 TRACER WIRE

A. Provide the following:
1. Tracer wire shall be No. 12 AWG, stainless steel, single conductor with Type UF insulation rated for direct burial service for all borings.
2. Tracer wire shall be No. 10 AWG, copper, single conductor, with Type UF insulation rated for direct burial service for open cut, blue jacket.

B. Tracer wire splices shall be made soldered. The soldered connection shall be coated with 3M Scotchkote electricians coating and then securely taped in a tee configuration.

C. Tracer wire signal connection box shall be a tracer wire access box (C.P. Test Services Valvco, Inc., TWABADJ).

D. Tracer wire ends shall be bonded to an 8-foot copper ground rod.

2.08 PIPE BEDDING AND BACKFILLING

A. Trenching, backfilling and compaction shall be in accordance with Section 02220, Trenching, Backfilling and Compaction and standard details on the drawings.

2.09 THRUST BLOCKING

A. Thrust blocks shall be constructed of concrete having a minimum 28-day compressive strength of 4,000 psi.

B. The minimum cement content shall be 6 bags of cement per cubic yard of concrete. The allowable slump shall be 4 to 5 inches

C. Blocking shall be placed between solid ground and the fitting to be anchored; the area of bearing on the pipe and on the ground shall be as shown or required by the Engineer.

D. The blocking shall, unless otherwise specified or required, be placed so that the pipe and fitting joints will be accessible for repair.

E. A piece of 15-pound building paper or other approved material shall be placed between the cap or plug and the concrete.

2.10 JOINT RESTRAINT MATERIAL

A. Rods shall be ¾-inch diameter, Type 304, or 316 Stainless Steel.

B. Underground clamps shall conform to the following:
   1. ½-inch x 2 inches flat bar stock clamps, Astral Corp., or equal.
   2. Clamps shall include retainer washer.

C. T-bolts shall be Type 304 or 316 stainless steel.
   1. All stainless steel threads shall be coated with nickel based anti-seize compound prior to assembly.
   2. In lieu of anti-seize compound, a green fluoropolymer coated stainless steel nut may be substituted. The coating shall be FlourKote#1 manufactured by Metal Coatings Corporation.

D. Megalugs, by EBAA iron, Sigma "One-Lok", or equal may be used for joint restraint.

2.11 BUILT UP MASTIC COATINGS

A. Materials shall be applied in full accordance with manufacturer's recommendations. Coating shall be Tapecoat, TC Mastic, or equal.

PART 3 - EXECUTION

3.01 GENERAL

A. Before excavation of trenches begins, the Contactor shall uncover the end of the existing water main to which the new main is to be connected. This will permit adjustments in line and grade to avoid using extra fittings. The exposed end of an existing main must be protected and blocked by the Contractor to prevent the blowing out of the plug or cap at the end of the main.

B. The Contractor shall have sufficient and adequate equipment on the site of the work for unloading and lowering pipe and fittings into the trench. Extreme care shall be exercised by the Contractor in handling all pipe, fittings, and special castings to prevent breakage and coating damage. Any significant damage to coating shall be repaired before installation. Under no circumstances shall pipe or fittings be dropped into the trench or so handled as to receive hard blows or jolts. All mud or concentration of dirt shall be removed prior to installation.

C. Every precaution shall be taken to prevent foreign materials from entering the pipe while it is being placed in the line. If the pipe-laying crew cannot put the pipe into the trench and in place without getting earth into it, the Engineer may require that before lowering the pipe into the trench, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the connection is to be made to the adjacent pipe. During the laying operations, no debris, tools, clothing, or other material shall be placed in the pipe.

D. At all times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means accepted by the Engineer. This provision shall apply during the

noon hour as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry. No pipe shall be laid in water or when trench conditions are unsuitable.

3.02 PIPE INSTALLATION

A. Pipe installation shall conform with Section 02220, Trenching, Backfilling and Compaction and bedding details shown on the drawings.

B. Lay pipe to line and depth shown on plans. Unless otherwise stated, pipe shall be laid with the bell ends facing the direction of laying. When grade exceeds two feet per hundred feet, the bells shall face upgrade.

C. When the depth is not shown on the plans, bury the pipe with 6.5 feet of cover as determined from the top of pipe to the finished ground elevation.

D. Keep pipe, fittings, and hydrants free of debris and foreign matter. The interior of all pipes shall be clean before being installed. The Contractor shall provide the necessary means to wipe, brush, swab, or air blast to remove foreign matter.

E. Assemble all joints in accordance with manufacturer's recommendations.

F. Utilize full lengths of pipe, except at fittings.

G. Provide thrust blocking or restraints at the following locations:
   1. Bend deflecting 11½ degrees or more.
   2. Hydrants.
   3. Valves and tees.
   4. Plugs and caps.

H. When it is necessary to interrupt an existing system to complete construction, adhere to the following:
   1. No valves, controls, or appurtenances shall be operated by the Contractor.
   2. Operation of existing valves, controls, and appurtenances for interruption of existing service shall be done by Owner personnel at the Owner's convenience and normal working schedule.
   3. Contact owner a minimum 24 hours prior to an anticipated interruption.

3.03 HYDRANTS

A. General
   1. Hydrants shall be set as shown in the detail. Immediately before installation of hydrants, the following operation shall be performed:
      a. The hydrant shall be thoroughly inspected and cleaned on the interior.
      b. The hydrant shall be opened and closed as many times as necessary to determine if all parts are in proper working order.

B. Location and Position
   1. Hydrants shall be located as shown or as required to provide complete accessibility and minimize the possibility of damage from vehicles or injury to pedestrians.

2. When placed behind the curb, the hydrant barrel shall be set so that no portion of the pumper or hose nozzle cap will be less than 18 inches nor more than 24 inches from the gutter face of the curb, unless otherwise shown on drawing details.
3. When set in the lawn space between the sidewalk and the property line, no portion of the hydrant or nozzle cap shall be within 6 inches of the sidewalk.
4. All hydrants shall stand plumb and shall have their nozzles parallel with, or at right angles to the curb, with the pumper nozzle facing the curb, except that hydrants having two hose nozzles 90 degrees apart shall be set with each nozzle facing the curb at an angle of 45 degrees. Hydrants shall be set to the established grade, with nozzles at least 18 inches above the ground as shown or as required by the Engineer.

C. Hydrant
1. Drainage shall be provided by placing crushed stone around the hydrant as shown on the detail. The minimum amount of crushed stone shall be 6 inches above the waste opening in the hydrant, and 1 foot around the hydrant.

3.04 VALVES

A. Install as shown on the drawings.

B. Provide gate valves for sizes through 12 inches.

C. Provide butterfly valves for sizes 14 inches and larger.

D. Install valve boxes plumb, and centered over valve operating nut:
1. Install in a manner that will prevent shock loads and stress being transmitted to the valve and water main.

3.05 POLYETHYLENE ENCASEMENT

A. Wrap all below ground metal in accordance with AWWA C105, including:
1. Ductile iron pipe.
2. Fittings, valves, and valve boxes.
3. Corporations, curb stops, and curb boxes - their entire length.
4. All portions of hydrants below grade.
5. Copper water services.
6. All metal restraining devices.

3.06 WATER SERVICES

A. Water services shall conform with all plumbing codes.

B. Terminate services at the property line or easement line as shown on the plans.

C. Unions may not be used unless approved by Owner's Representative.

D. Connection to water main.
Water services shall be made by tapping the water main for the corporation stop unless use of a service saddle is required. The corporation stop connection shall be a minimum of 1 foot from

any pipe or fitting joint and must have a minimum of 1 foot between connections and stagger 30° around the circumference of the water main.

E. All polyethylene water services shall have tracer wire brought up and cable wrapped with zip ties to the outside of the curb box. Tracer wire shall be extended to the termination point of the service.

F. All connections to water main shall be under system pressure when the water services are installed as part of relay construction. All connections to water main during new construction shall be under system pressure and tested when the water main is tested.

G. Corporation Stops, Curb Stops, and Curb Boxes
Unless specified otherwise, the Contractor shall provide and install one corporation stop, curb stop, and curb box, at each water service. Corporation stop and curb stop shall be service line size unless specified otherwise.

H. Position and Grade
In common trench construction, the water service shall be run parallel and a minimum of 12 inches above the sanitary sewer lateral. The water service shall be laid with a minimum cover of 6 feet or shall be insulated with acceptable material. The curb stop shall be placed between 6 and 7 feet below established or proposed grade.

I. Setting the Curb Box
The curb box shall be centered over the curb stop and shall be brought to proper grade. The legs of the service box shall rest firmly upon a 2-inch x 5-inch x 8-inch hardwood board or 4-inch x 8-inch x 16-inch solid concrete block. Clearance shall be provided so that the service box does not rest upon the water service pipe. Where the bench does not afford a firm support for the service box blocking, such support shall be finished by the use of a 2-inch by 6-inch plank placed across the building sanitary sewer trench and firmly supported in each bank.

The curb box shall be plumbed and braced so it will remain vertical throughout the backfilling. Sufficient excavation shall be made for the curb box installation to ensure proper setting and backfilling around the curb box.

Before placing backfilling around the curb service box, the Contractor shall wrap polyethylene around the base, and bedding material shall be tamped in place from a point above the main to a point 6 inches above the blocking to prevent entrance of backfill materials into the openings at the base.

J. Protection of Curb Stop and Service Pipe
A copper disc shall be inserted in the curb stop coupling on the building side. The open end of copper water services shall be closed by peening the end.

3.07 TRACER WIRE

A. Run tracer wire along pipe from hydrant to hydrant.

B. Tape wire to each length of pipe at a minimum of two points.

C. A maximum of one splice will be allowed between each hydrant.

D. Tracer wire shall be tested for continuity prior to acceptance of project.

3.08 PROTECTION OF BURIED METAL SURFACES

A. All steel clamps, rods, bolts, and other metal accessories using reaction anchorage or joint harness and all mechanical pipe fittings installed underground shall be protected with a built-up mastic coating and covered with a polyethylene in accordance with this section.

B. Surfaces shall be cleaned by wire brushing immediately prior to application of the mastic.

C. The mastic shall be molded firmly to encase all bolts, nuts, clamps, straps and flanges, and built-up to a uniform surface over the entire fitting.

3.09 TAPPING SLEEVES AND VALVES

A. Tapping sleeves shall be of the flanged outlet type designed for attachment to the flanged inlet end of the tapping valve. Sleeve shall be rated for 150-psi working pressure.

B. Tapping sleeves shall be of cast iron or of Type 304 stainless steel construction.

C. With the exception of valve ends and oversize seat rings to permit entry of the drilling machine cutters, tapping valves shall conform to the requirements of AWWA C509.

D. Each tapping valve shall be provided with a flanged inlet end for attachment to the outlet flange of the tapping sleeve, and with an outlet end suitable for attachment of a drilling machine and the type of pipe used. Unless otherwise specified, each tapping valve shall be arranged to turn left (counterclockwise) to open and shall be provided with a 2-inch operating nut and valve box.

E. Each tapping sleeve and valve assembly shall be furnished and installed complete with gaskets as required and with all bolts for the sleeve and for the flanged connection between the sleeve and valve, in strict conformity with the directions and instructions of the manufacturer of the tapping sleeves and valves furnished.

F. The Contractor shall submit details of proposed sleeve and valve for the Engineer's review. Sleeve and valve shall be as manufactured by Kennedy Valve Mfg. Co., Clow Corporation, Dresser Industries, Romac Industries, or equal.

3.10 JOINING PIPE OF DIFFERENT MATERIAL OR OUTSIDE DIAMETER

A. Where specified or required, pipes of different material or outside diameter shall be joined with mechanical pipe couplings.

B. Couplings shall be suitable for the intended service and shall be installed in accordance with the manufacturer's instructions.

C. The Contractor shall submit details of proposed coupling for Engineer's review.

D. Mechanical pipe couplings shall be Dresser Style 162 or equal.

3.11 CONTRACTOR RECORD KEEPING

A. Measure and record the following:
   1. Service locations: Point of origin and terminus.
   2. Valve and fitting locations.
   3. Water main locations.

3.12 DISINFECTION

A. The following water main shall be disinfected:
   1. New water main.
   2. Existing water main when cut into or repaired.
   3. Disinfect and flush system until samples test safe.

B. Contractor will set-up sampling, and the owner will take sample and test sample, and have an independent laboratory certify that water is free of coliform bacteria.

C. Tablet Method: AWWA C651
   1. Place 5-gram calcium hypochlorite tablets each section of pipe as determined by the following table:

Number of Tablets Per Section of Pipe

Pipe Diameter (inches)	Length of Pipe section (feet)		
	13 or less	18	20
4	1	1	1
6	1	1	1
8	1	2	2
10	2	3	3
12	3	4	4
16	4	6	7

   2. Place one tablet in each hydrant, hydrant lead, and other appurtenance.
   3. Attach tablets with a food-grade adhesive to the top inside surface of the pipe:
      a. Adhesive shall be USDA for contact with edible products.
      b. Adhesive shall be Permatex Form-A-Gasket No. 2, Permatex Clear RTV Silicone, or equal.
      c. Permatex Form-A-Gasket No. 1 is not acceptable.
   4. Fill main in a manner such that the water velocity within the main will not exceed 1 fps.
   5. Water shall remain in pipe for a minimum of 24 hours, if water temperature is less than 40° F, it shall remain in pipe a minimum of 48 hours.
   6. For pipe diameters larger than 16 inches, refer to AWWA C651 for correct calcium hypochlorite dosage.

3.13 PIPE TESTING

A. Perform pipe testing in accordance with Section 01661, Testing and Inspection of Pipeline Construction.
   1. After disinfection testing has been completed.
   2. Disinfect all testing equipment and fittings.

- END OF SECTION -

SECTION 02730

SANITARY SEWER

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included: This section shall include furnishing all materials for the sanitary sewer work as shown on the drawings and as specified herein.

B. Related Sections and Divisions:
1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Section 01563, Erosion Control.
4. Section 01661, Testing and Inspection of Pipeline Construction.
5. Section 02220, Trenching, Backfilling and Compaction.
6. Section 02290, Soils and Aggregates
7. Section 02600, Buried Piping and Appurtenances.
8. Section 02616, Ductile Iron Pipe.
9. Section 02622, PVC Plastic Pipe.
10. Section 02720, Storm Sewerage and Drainage.
11. Section 02936, Landscaping.

1.02 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM), Current Annual Book of Standards.

B. American Association of State Highway and Transportation Officials (AASHTO).

1.03 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300, Submittals including:
1. Product literature and catalog cut sheets of materials to be supplied that relate to these specifications.
2. One copy of all test reports.

1.04 PROTECTION OF PROPERTY MARKERS

A. Contractor shall protect all property marker from movement from original position.

B. Cost of replacement of property markers during construction shall be at the contractor's expense.

PART 2 - PRODUCTS

2.01 PIPE MATERIAL

A. PVC Sewer pipe shall be in accordance with Section 02622, PVC Plastic Pipe.

B. Ductile iron pipe shall be in accordance with Section 02616, Ductile Iron Pipe.

C. Concrete Reinforced Pipe shall be in accordance with Section 02720, Storm Sewerage and Drainage.

D. Polyethylene pipe shall be in accordance with Section 02623, Polyethylene Pipe.

2.02 MANHOLES

A. Precast Manholes
1. Manholes and drop manholes shall conform with ASTM C478 for precast components.
2. Base section shall have a 6-inch minimum thick integral floor slab with 4-inch thickness for walls and riser sections. Base section shall be cast monolithically.
3. Joints shall conform with ASTM C443.
3. Gasket shall be 1¼ -inch thick butyl conforming with AASHTO M198.
4. Manhole top shall be pre-cast eccentric cone.

B. Cast-In-Place Manholes
1. Conform with drawing details.
2. Use only where called for on drawings.

C. Pipe Seals
1. Seals shall be flexible, watertight gasketed for pipe entrance holes.
2. Acceptable manufacturers shall be A-Lok Products or equal.

D. Manhole Steps
1. Manhole shall be a ½-inch diameter grade 60 steel reinforcement rod encapsulated in copolymer polypropylene.
2. Steps shall be as manufactured by M.A. Industries, Inc., or equal.

E. Castings
1. Castings shall conform to ASTM A48, Class 35.
2. Shall be AASHTO H-20 rated.
3. Lid shall be a non-rocking with concealed pick holes and self-seal neoprene "T" gasket.
4. Use Neenah R-1500 or equal.
5. Use Neenah R-1916C or equal when watertight castings where shown on the plans.

F. Sewer Joint Compound
1. Sewer joint compound shall be as manufactured by Pure Asphalt Company or equal.

2.03 CLEAN-OUTS

A. Light duty: In earth or grass foot-traffic areas, provide a frost sleeve for DCOMM 82.35 (S)(A)2 Requirements.

B. Heavy Duty: In vehicle traffic areas use top loading rated heavy duty, ASME A112.36.2M, round, cast-iron housing with clamping device and round secured, scoriated cast-iron cover. Include cast-iron ferrule with inside caulk or spigot connection and countersunk, tapered-thread, brass closure plug.

C. Frost sleeve shall be same material as specified for sanitary sewer piping.

2.04 WYES, RISERS, AND FITTINGS

A. Shall be the same type and class as the sewer service pipe.

2.05 INSULATION BOARD

A. Extruded polystyrene conforming with ASTM C578.

B. Insulation shall be a minimum 1-inch thick.

C. Provide where required by plans.

2.06 PIPE BEDDING AND BACKFILLING

A. Pipe bedding and haunch shall be compacted to a minimum of 90% of modified proctor to the springline of the pipe prior to placement of initial backfill.

B. Subsequent backfilling shall be in accordance with the standard details in the drawings and conform with Section 02220, Trenching, Backfilling, and Compacting.

PART 3 - EXECUTION

3.01 SEWER MAIN INSTALLATION

A. Pipe Installation
   1. Lay pipe upgrade with spigot pointing in direction of flow.
   2. When any portion of a section of sewer between manholes has a bury depth equal to or greater than 25 feet, SDR-26 pipe shall be installed.
   3. When the entire section of sewer between manholes is less than 25 feet of bury depth, SDR-35 may be installed.

B. Grade and alignment shall be established with laser equipment.
   1. Sewers shall be laid with straight alignment between manholes.
   2. Slope between manholes shall be uniform with no ponding water.
   3. Laser alignment shall be checked a minimum of every 100 feet.

C. Water/Sewer Line Crossing
   1. Wherever the sanitary sewer crosses above watermain with less than a clear vertical separation of 18 inches (outside of pipe to outside of pipe) or below the watermain with less than a clear vertical separation of 6 inches (outside of pipe to outside of pipe), the sewer shall be constructed equal to watermain pipe. One full pipe length shall be centered on the watermain crossing and shall be pressure tested.
   2. The type of pipe material and/or joints shall not change between manholes.

D. Maintaining Sanitary Sewer Service
   1. The Contractor shall provide adequate equipment and facilities to provide bypass pumping for all elements of work requiring interruption to flow in the sanitary sewer. Provide backup or standby capabilities satisfactory to the Owner. The Contractor shall be responsible for damages to private or public property due to sewer backup while controlling sewage flow.

2. Under no circumstances will bypassing of untreated wastewater to any storm drainage facility or surface water course be allowed.
3. The Contractor shall notify the Owner and Engineer seven (7) days in advance of sewer sections, which will not be useable in order to allow time for the Owner to notify residents. Interruptions shall then be verified at least 24 hours in advance.
4. Interruptions of service shall be limited to eight (8) hours.
5. All existing sanitary laterals shall be permanently reconnected within two days after initial disconnection of the main line sewer bypass. These existing sanitary laterals shall be temporarily reconnected if the permanent reconnection cannot be accomplished immediately after disconnection.
6. All costs for flow control, temporary pumping, etc., shall be inclusive to the unit price bid for sanitary sewer.
7. All costs associated with connecting proposed sewers to existing sewers or manholes, manhole removal and abandonment, sanitary sewer removals and abandonment, shall, be included in the unit price bid for sanitary sewer.

3.02 SERVICE CONNECTIONS

A. Unless indicated otherwise, terminate services at the property line.

B. Services shall conform with all plumbing codes for depths and installation. Service depth shall be twelve (12) feet deep at the property line, or as deep as sewer main allows, or as shown on plans.

C. Clean-outs required by the plumbing code or ordinances shall be incidental to the service installation.

D. When a service is not immediately connected.
1. Mark in accordance with details. The Contractor shall record the location, length and depth for record drawings.
2. Provide a watertight cap on end of service.

E. Install wye branches where directed
1. New sewers: Utilize a factory made wye.
2. Existing sewers- Utilize a saddle type wye.
3. Wyes connected to concrete pipe shall be core drilled and installed with a flexible watertight connector, which can be mechanically expanded into the cored opening.
4. Wyes shall be oriented at a ten (10) or two (2) o'clock position from the main.

F. Riser Installation
1. Install where requested by Owner's Representative.
2. Conform with appropriate details.
3. Bends shall be 45°.
4. Place risers on a minimum of 6-inches of Soil Class A-7 compacted to 95% Modified Proctor Density.
5. Risers shall be installed at maximum 45° from horizontal. (standard service lateral or deep service lateral).
6. Risers shall be installed at maximum 67.5° from horizontal (optional deep service lateral).

3.03 MANHOLES

A. Installation
   1. Place manholes on a minimum of 6 inches of Soil Class A-7 compacted to 95% Modified Proctor Density.
   2. Establish flow line and rim elevations from grade stake provided.
   3. Furnish 4-foot diameter manholes (standard diameter) when dimensions are not shown on the plans.
   4. Manholes shall be precast construction, unless shown otherwise.
   5. Provide manhole riser sections in a combination of lengths, which will minimize the number of joints.
   6. Seal manhole joints with 1¼-inch Butyl-Lok preformed tape or equal, conforming the AASHTO M-198.
   7. Adjusting rings:
      a. Manhole casting shall be centered, brought to grade and embedded in two rows of 3/8-inch x ½-inch Kent Seal, or equal.
      b. A minimum of 4 inches of adjusting rings shall be used between the manhole frame and casting.
      c. All adjusting rings less than four inches shall be rubber. Two-inch concrete adjusting rings are not allowed.
      d. For manholes located in roadways, the upper two inches shall be rubber adjusting rings.
      e. For manholes located in traffic lanes, use tapered rubber adjusting rings.
      f. Maximum height of adjusting rings shall be 12 inches.
      g. Coat outside of adjusting rings only with sewer joint compound per manufacturer's instructions.
      h. When watertight castings are shown on the plans, casting shall be anchored to the manhole structure.
   8. Pipe shall enter manholes through a flexible, watertight gasket or connector manufactured in accordance with ASTM C443 or C923.
      a. Whenever practical, pipe opening shall be factory made using A-Lok or equal.
   9. The following shall be filled with mortar and finished smooth
      a. Lift holes.
      b. Annular space around pipes: Interior bottom half only.

B. Inverts
   1. Furnish precast manholes with shop manufactured inverts
   2. Shape and slope flow line of invert to match largest connecting pipe.
   3. Slope invert bench upward to manhole wall.

C. Precast Drop Manholes
   1. Coat outside of adjusting rings only with sewer joint compound per manufacturer's instructions.
   2. Furnish where shown on plans and conform with plan details.

3.04 CLEAN-OUTS

A. Install clean-outs and riser from sanitary sewer pipe to clean-out at grade. Install piping so clean-outs open in direction of flow.

B. Set clean-outs frames and covers in unpaved areas flush with finished grade.

C. Set clean-outs frames and covers in paving with tops flush with surface paving.

D. Set clean-out frames and covers in pavement in a cast-in-place concrete block, 18-inch x 18-inch x 12-inch deep. Slope top of concrete away from clean-out.

3.05 PIPE TESTING

A. Pipe testing shall be in accordance with Section 01661, Testing and Inspection of Pipeline Construction.

3.06 REPAIRS

A. Contractor shall repair all visible leaks, defects, and pipeline, which have failed testing.

B. After repairs are made, re-test and re-televise repaired sections.

PART 4 - MEASUREMENT AND PAYMENT

4.01 SANITARY SEWER

A. Measurement shall be made horizontally along the centerlines of the pipeline actually installed with no deductions for manholes.

B. Payment shall be made by the unit price per linear foot and include:
1. Pipe material, equipment, and labor.
2. Clearing and grubbing.
3. Stripping and stockpiling topsoil.
4. Traffic, dust and erosion control.
5. Loading, hauling and disposal of street surfacing and curb & gutter in trench area.
6. Dewatering and excavation.
7. Pipe bedding and initial cover material.
8. Loading, hauling and disposal of surplus excavated material.
9. Backfilling and compaction.
10. Wye's or Tee's for sewer services.
11. Complete restoration and landscaping.
12. Repair and maintenance of disturbed street surfaces.
13. Quality control testing.

4.02 SEWER SERVICE

A. Measurement shall be made horizontally along the centerline of the pipe from the centerline of the sewer main to the end of the sewer service.

B. Payment shall be made by the unit price per lineal foot and include:
1. Pipe material, equipment, and labor.
2. Clearing and grubbing.
3. Stripping and stockpiling topsoil.
4. Traffic, dust and erosion control.

5. Loading, hauling and disposal of street surfacing and curb & gutter in trench area.
6. Dewatering and excavation.
7. Pipe bedding and initial cover material.
8. Loading, hauling and disposal of surplus excavated material.
9. Backfilling and compaction.
10. Riser pipes.
11. All fittings including end caps.
12. Location markers.

4.03 MANHOLES

A. Measurement shall be made from the invert to the rim as installed.

B. Payment shall be made by the unit price per vertical foot installed and shall include:
1. Dewatering and excavation.
2. All pre-cast components, steps and frame and cover.
3. Gasketed pipe openings and joint seals.
4. Adjusting rings and sewer joint compound.
5. Drop manholes shall include the pre-cast drop.
6. Chimney seals.

4.04 BORING AND JACKING CASING PIPE

A. Measurement for the casing pipe shall be made along the centerline of the casing pipe as installed.

B. Payment shall be made by the unit price per linear foot installed and include:
1. Labor, equipment, and material necessary to install the casing pipe.
2. Blocking and supports necessary to anchor the sewer pipe inside the casing pipe.
3. Placing a sand slurry, pea gravel, or fly ash slurry to completely fill the annular space between the casing and sewer pipe.
4. The sewer pipe placed inside of the casing.

- END OF SECTION –

SECTION 02936

LANDSCAPING

PART 1 -GENERAL

1.01 SUMMARY

A. Work Included: This section includes the following:
   1. Preparation of subsoil.
   2. Placing topsoil.
   3. Testing and correcting soil pH, if necessary.
   4. Seeding, sodding, mulching and fertilizing.
   5. Maintenance.

B. Related Sections and Divisions:
   1. Applicable provisions of the General Conditions shall govern work in this section.
   2. Section 01300, Submittals.

1.02 REFERENCES

A. FS O-F-241 - Fertilizers, Mixed, Commercial.

B. Association of Official Seed Analysis (AOSA).

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals:
   1. Fertilizer certification from supplier including brand name and chemical analysis.
   2. Certification of conformance with AOSA attesting to seed mix, age, weed content, purity, and germination.
   3. Sample of mulch material upon request of Owner's representative.
   4. Sample of erosion mat and certification of its properties.

1.04 QUALITY ASSURANCE

A. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

B. Sod: Minimum age of 18 months, with root development that will support its own weight without tearing, when suspended vertically by holding the upper two corners. Submit sod certification for grass species and location of sod source.

1.05 DELIVERY, STORAGE, AND PROTECTION

A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.

B. Deliver sod on pallets or in rolls. Protect exposed roots from dehydration. Do not deliver more sod than can be laid within 24 hours.

C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

PART 2 - PRODUCTS

2.01 TOPSOIL

A. Topsoil shall consist of the natural loam, sandy loam, silt loam, silty clay loam or clay loam humus-bearing soils adapted to the sustenance of plant life, and such topsoil shall be neither excessively acid nor excessively alkaline.

B. 100 percent of the topsoil shall pass a one-inch sieve and at least 90 percent shall be a No. 10 sieve.

2.02 FERTILIZER

A. Type A fertilizer shall meet the following minimum requirements:
   1. Nitrogen, not less than 16%
   2. Phosphoric Acid, not less than 6%
   3. Potash, not less than 6%
   4. Sum of nitrogen, phosphoric acid and potash shall be not less than 32 percent. Total nitrogen shall be not less than the sum of the phosphoric acid and soluble potash.

B. Type B fertilizer shall meet the following minimum requirements:
   1. Nitrogen, not less than 16%
   2. Phosphoric Acid, not less than 6%
   3. Potash, not less than 24%
   4. Sum of nitrogen, phosphoric acid and potash shall be not less than 50 percent.

2.03 SEED

A. Conform with the requirements of the governing authority for seeding and for restrictions on noxious weed seed.

B. Seed mixture shall be composed of seeds of the purity, germination, and proportion by weight as follows:

SPECIES	PURITY minimum %	GERMINATION minimum %	MIXTURE PROPORTIONS in percent				
			NO. 10	NO. 20	NO. 30	NO. 40	NO. 60
Kentucky Bluegrass	98	85	40	6	10	35	--
Red Fescue	97	85	25	--	30	20	--
Hard Fescue	97	85	--	24	25	20	--
Tall Fescue	98	85	--	40	--	--	--
Salt Grass	98	85	--	--	10	--	--
Redtop	92	85	5	--	--	--	--
Timothy	98	90	--	--	--	--	12
Canada Wild Rye		Pure Live Seed (1)	--	--	--	--	10
Perennial Ryegrass	97	90	20	30	--	--	--
Improved Fine Perennial Ryegrass	96	85	--	--	15	25	--
Annual Ryegrass	97	90	--	--	--	--	30
Alsike Clover	97	90	--	--	--	--	4
Red Clover	98	90	--	--	--	--	4
White Clover	95	90	10	--	--	--	--
Birdsfoot Trefoil	95	80	--	--	10	--	--
Crown Vetch	95	80	--	--	10	--	--
Japanese Millet	97	85	--	--	--	--	20
Annual Oats	98	90(1)	--	--	--	--	20

(1) Substitute winter wheat for annual oats in fall plantings started after September 1.

C. Add 1½ bushels of oats per acre if seeded before July 15th or 1½ bushels of winter wheat if seeded after July 15th for cover crop.

D. Birdsfoot Trefoil and Crown Vetch seed will be inoculated in accordance with manufacturer's recommendations except when hydroseeders are used. When seed is applied with hydroseeder, five times the normal rate of inoculant will be added to the hydroseeder.

2.04 MULCH

A. Mulch shall consist of straw, hay, marsh hay or wood chips which are free of noxious weeds and other objectionable foreign matter.
   1. If wood chips are used, the mulch area shall be treated with one (1) pound of available nitrogen per 1,000 square feet.

B. Mulch binder shall conform to one of the following:
   1. Emulsified asphalt shall meet the requirements for Type SS-1 AASHTO M140.
   2. Terra Tack 1, or equal.

2.05 SOD

A. The sod shall consist of a dense, well-rooted growth of permanent and desirable grasses, indigenous to the general locality where it is to be used.

B. Sod shall meet the following general requirements:
   1. Free from weeds and undesirable grasses.
   2. Grass length of two (2) inches.
   3. Cut in uniform strips 18" x 72".
   4. Uniform thickness of 1½-inch or more.
   5. Adequately watered to prevent crumbling, breaking or tearing during handling and placement.

2.06 TEMPORARY EROSION CONTROL BLANKET

A. Manufacturer: North American Green, S75; American Excelsior Company, Curlex; or equal.

B. Material Composition
   1. Single net: 100% photodegradable.
   2. Matrix: 100% agriculture straw.
   3. Thread: degradable.

2.07 PERMANENT EROSION CONTROL BLANKET

A. Manufacturer: North American Green, P300; American Excelsior Company, Recyclex TRM; or equal.

B. Material Composition
   1. Top and bottom net: 100% UV stabilized polypropylene.
   2. Matrix: UV stabilized polypropylene fiber.
   3. Thread: UV stabilized polypropylene.

2.08 LIMESTONE

A. Limestone shall be ground agricultural limestone containing not less than 90% calcium carbonate and shall be ground to such a fineness that 50% shall pass a U.S. Standard Sieve No. 96 and 90% shall pass a U.S. Standard Sieve No. 100.

B. Rates of application shall be as specified or as requested by the Engineer as a result of periodic soil testing and consultation with the district Soil Conservation Service.

2.09 ALUMINUM SULFATE

A. Aluminum sulfate shall be unadulterated and delivered to the site in the manufacturer's original containers with name of the material, manufacturer's name and net weight clearly marked on each container. Aluminum sulfate shall be used only in a dry powdery state.

B. Rates of application shall be as specified or as requested by the Engineer as a result of periodic soil testing and consultation with the district Soil Conservation Service.

PART 3 - EXECUTION

3.01 TOPSOILING

A. Topsoil all areas which are required to be seeded. Place topsoil to the following depth:
   1. Seeded areas: 6 inches when settled.

B. Topsoil Placement In Rural Areas
   1. Place to required depth.
   2. Remove all rocks larger than 1½ inches.
   3. Remove all debris.
   4. Mechanically break down all clods and lumps.
   5. Mechanically level and rake prior to applying seed.

C. Topsoil Placement For Seeding Lawns
   1. Mechanically level subgrade to allow uniform placement of topsoil.
   2. Remove rocks, roots, clods and other foreign material.
   3. Place topsoil to required depth.
   4. Mechanically level topsoil.
   5. Rake topsoil smooth and remove all lumps.
   6. Seed as required.

3.02 FERTILIZING AND LIMING

A. Fertilize all areas to be seeded.

B. Apply any required fertilizer and lime uniformly onto the surface of the prepared seedbed.

C. When hydroseeders are not used, the fertilizer and lime shall be incorporated into the top 3 inches of the soil with suitable tillage equipment.

D. Apply fertilizer at a rate determined as a result of periodic soil testing and consultation with the district Soil Conservation Service.

E. Use type of fertilizer best suited for area.

3.03 SEEDING

A. Selection of seed mixtures, rate of seeding and intended use of the mixtures will be as follows:

Seed Mixture	Rate of Seeding (Lbs. per 1,000 sq. ft.)	Intended Use
No. 10	1½	Average loam or heavy clay soils. All ditches, inslopes grass areas.
No. 20	3	Light, sandy or gravelly soils. All ditches, inslopes.
No. 30	2	In rural areas on cut and fill slopes exceeding 6 to 8 feet.

No. 40	4	In urban area or other areas where a lawn type turf is desired.
No. 60	½	Critical area stabilization. May be used in con-junction with mixture No. 1 and No. 2 on steep slopes.

B. Seeding period shall be as recommended by the seed supplier.

C. Seeding
1. Utilize a machine or combination of machinery which will produce the following:
   a. Apply seed uniformly at the rate specified.
   b. Cover seed with approximately ½ inch of topsoil.
   c. Roll lightly.
   d. Apply seed at right angles to surface drainage.

3.04 MULCHING

A. General
1. Place a straw or hay mulch within 72 hours after seeding.
2. Do not place during high winds.
3. Place loosely enough to allow some sunlight penetration and air circulation, but thickly enough to shade ground, conserve moisture and reduce erosion.

B. The Contractor may elect to perform mulching in accordance with one of the following methods:
1. Method "A"
   a. Spread mulch material uniformly by blowing in place to a loose depth of ½ to 1½ inches.
   b. Mulching shall begin at tops of slopes and proceed down.
   c. Anchor mulch with a biodegradable netting or twine secured with pegs or staples forming a six (6) to ten (10) foot grid.
2. Method "B"
   a. Mulch shall be treated with emulsified asphaltic material and blown in place in one operation.
   b. Mulch shall be blown uniformly to a depth of ½ to one inch.
   c. Mulch shall be treated with emulsified asphalt at a rate of 75 to 100 gallons per ton.
3. Method "C"
   a. This shall be the same as Method "A" except mulch will be anchored by impressing into the soil to a depth of 1½ to 2½ inches with a tiller in a single pass.

3.05 SODDING

A. Placing Sod
1. Moisten topsoil to loosened depth of three (3) inches.
2. Place sod within 24 hours after initially cut.
3. Laying sod strips
   a. Lay sod so abutting end joints are not continuous.

b. Sod strips shall abut snugly against each other.
c. Sod shall be level with adjoining turf or grade.
d. Water and roll or lightly tamp sod immediately after placement.
e. At the limits of the sodded area, end strips shall be staggered.
f. At the end of all sod strips, turn sod into soil, cover with topsoil, and compact.

4. Laying sod on slopes and in waterways.
   a. In waterways, place sod with longer dimension perpendicular to water flow.
   b. On slopes, place sod with longer dimension parallel to the contours the ground.

B. Staking Sod
1. Stake sod in all waterways and on all slopes steeper than one (1) foot vertical to two (2) feet horizontal.
2. Stakes shall be wood lath minimum of twelve (12) inches long.

3.06 EROSION CONTROL BLANKET

A. Installation in Ditches (where shown on the plans).
1. Prepare soil including lime, fertilizer, and seed.
2. Place a eight (8) foot wide roll centered on ditch flowline.
3. Roll out blanket in the direction of the water flow and overlap ends six inches in a shingle style.
4. Anchor edges and ends in a 6" x 6" trench. Backfill and compact trench after stapling.
5. Stapling:
   a. Install per manufacturer's instructions.

B. Installation on Slopes (where shown on the plans).
1. Prepare soil including lime, fertilizer, and seed.
2. Place blankets down or across the slope.
3. Seams which run down the slope shall be lapped a minimum of two (2) inches.
4. Seams running across the slope shall be lapped a minimum of four (4) inches shingle style.
5. Anchor the edges of the blanket in a 6"x 6" trench. Backfill and compact trench after stapling.
6. Stapling:
   a. Install per manufacturer's instructions.

3.07 APPLICATION

A. The Contractor shall landscape all areas disturbed by construction activities on and adjacent to the construction site including:
1. Earthen stockpiles.
2. Equipment parking areas.
3. Areas disturbed from transporting equipment.
4. Areas disturbed from storing materials.

B. Apply landscaping procedures as follows:
1. Lawns
   a. Topsoil
   b. Seed

c. Fertilize
d. Mulch and mulch binder

2. Rural and unmowed areas
   a. Topsoil
   b. Seed
   c. Fertilize
   d. Mulch and mulch binder
3. Stockpiles: Seed and mulch.

C. Apply erosion control blankets to the following:
1. Ditch lines disturbed by construction as shown on the plans.
2. Slopes 2:1 or greater.

D. Sod areas as shown on plans.

3.08 MAINTENANCE

A. Maintain all seeded and sodded areas until the following conditions are met:
1. Seeding has established a stand of grass which is uniform in density and color.
2. Sodding has established a root system in to the sod bed.
3. Landscaping is capable of resisting erosion.

B. Watering of turf and repairing erosion shall be included in maintenance.

C. Where vegetation has not been satisfactorily established. CONTRACTOR shall reseed such areas until suitable vegetation has been established.

3.09 MEASUREMENT AND PAYMENT

A. Landscaping shall be incidental to other work and shall be included in the respective unit price bid item.

- END OF SECTION -

3

DIVISION 3

CONCRETE

SECTION 03100

CONCRETE FORMWORK

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. This section covers the work necessary to furnish and install, complete, concrete formwork as specified herein.

1.02 SUBMITTALS

A. Shop Drawings: Furnish the following:
   1. Alternate Form Ties – Tapered Through-Bolts: Proposed method of sealing form tie hole; coordinate with details shown.
   2. Samples: Prior to start of work, submit one sample each as follows:
      a. Form liners.
      b. Form ties.

1.03 SEQUENCING AND SCHEDULING

A. Schedule work for embedded, buried, or other items of work that affects form layout before completing concrete formwork.

PART 2 – PRODUCTS

2.01 FORM MATERIAL

A. Wall Forms:
   1. General:
      a. Form Surfaces: In "new and undamaged" condition of either plywood, hard plastic finished plywood, overlaid waterproof particle board, or steel of sufficient strength and surface smoothness to produce specified finish.
      b. Concrete Finish Requirements: As specified in Section 3300, Concrete.
      c. Design joints in forms to remain watertight and withstand placing pressures without bulging outward or creating surface patterns.
      d. Do not use formwork that leaks mortar.
      e. Where poor formwork is used and finish obtained is less than specified, upgrade finish to an acceptable finish at no additional cost.
      f. Panel Deflections: Limit as required to achieve tolerances specified herein.
   2. Circular Structures:
      a. Forms shall conform to circular shape of structure.
      b. Straight panels may be substituted for circular forms if they do not exceed 2 feet in width and in addition to the requirements, each panel does not provide an angular deflection more than 3-1/2 degrees per joint, and do not conflict otherwise with these Specifications and/or Drawings.
   3. Rustications and Corner Strips: Non-absorbent material, compatible with form surface, fully sealed on all sides, to prohibit loss of paste or water between the two surfaces.
   4. Form Sealer:
      a. Manufacturer:
         1) Burke Co., Burke Uni-Kote.

2) Grace construction Materials Co., FormFilm.
3) Sternson Construction Products, Formaseal.
4) Or equal.

B. Column Forms:
1. Rectangular Columns: As specified for walls.

C. All Other Forms: Materials as specified for wall forms, unless otherwise approved by Engineer.

2.02 FORM DESIGN AND WINDOWS

A. General:
1. Design formwork prior to fabrication, placing order, or use on jobs.
2. Design shall account for tolerances, form ties, finishes, architectural features, rebar supports, construction joint locations, and other non-structural formwork requirements specified.
3. Design formwork strong enough to hold high liquid heads without form distortion and to meet tolerances as specified herein. Coordinate form design with admixture company information and concrete slump.
4. Forms for walls shall contain pouring and observation windows to allow placement of concrete through windows or staged to allow visual observation at all times of fresh concrete to ensure correct placement and vibration.
5. Free Fall Limit of Concrete: As specified in Section 03330, Concrete.
6. Structurally design forms, falsework, shoring, and other structural formwork and meet applicable safety regulations, current OSHA regulations, and other codes.
7. An engineer registered in State of Wisconsin shall prepare formwork, falsework, and shoring designs to meet these Specifications and to meet all federal and state requirements.
8. Make designs available to any governing agency upon request.
9. Meet applicable portions of ACI 347, ACI 318 current edition, and these specifications.

2.03 REINFORCING SPACERS AND REBAR SUPPORTS

A. Columns:
1. Provide a positive plastic tipped or stainless steel spacer between column reinforcing and column forms to ensure adequate cover.

B. Walls: Provide a positive spacer between wall reinforcing and wall forms to ensure adequate cover.

C. Floors and beams: Provide a positive plastic tipped or stainless steel support between reinforcing and slab or beam forms. Provide supports with sand plates supporting reinforcement for slabs on grade.

2.04 FORM TIES

A. General:
1. Inserts:
a. Conical or spherical type inserts.
b. Fixed so they remain in contact with forming material.
c. Construct so no metal is within 1 inch of concrete surface when forms, inserts, and tie ends are removed.

2. Do not use wire ties.
3. Ties shall withstand form pressures and limit form deflection to specified tolerances.
4. Flat bar ties for panel forms shall have plastic or rubber inserts with minimum 1-inch depth and sufficient dimensions to permit proper patching of tie hole.

B. Water Stop Ties:
1. Provide for water-holding structures or dry structures with access such as basements, pipe tunnels, etc., that are below finish grade or whose wall is common to water holding basin or channel.
2. Ties shall have either an integral steel water stop 0.103-inch thick and 0.625 inch in diameter tightly and continuously welded to tie, or neoprene water stop 3/16-inch thick and 15/16 inch in diameter whose center hole is 1/2 diameter of snap tie, or a molded plastic water stop of comparable size.
3. Flat snap ties meeting these Specifications may be provided.
4. Water Stop: Considerably larger in area than tie cross sectional area, oriented perpendicular to tie and symmetrical about center of tie.
5. Construct ties to provide positive means of preventing rotation or disturbance of center portion of tie during removal of ends and prevent water leaking along tie.

C. Alternate Form Ties – Through-Bolts:
1. Form ties consisting of tapered through-bolts as shown with minimum 1 inch in diameter at smallest end, or through-bolts utilizing a removable tapered sleeve of same minimum size may be provided as an option. Through hole requires preparation of concrete surface prior to patching; see detail.
2. Elastic Vinyl Plug:
   a. Size to allow insertion using insertion tool to elongate plug, place it at correction location, and allow plug to return to original length and diameter upon removal to form watertight seal.
   b. Manufacturer:
      1) Dayton Sure-Grip and Shore Co., Miamisburg, OH, Dayton Sure Plug.
      2) Or equal.

PART 3 – EXECUTION

3.01 INSTALLATION

A. General:
1. Notify engineer one full working day prior to concrete placement so forms can be inspected.
2. Correct deflective work found in Engineer's inspection, prior to delivery of concrete.

B. Wall Forms:
1. Do not reuse form surfaces that have been damaged and are no longer in smooth "new and undamaged" condition unless otherwise approved in writing.
2. Provide specified smooth form surfaces meeting tolerance requirements prior to each reuse.

C. Forms to Support Form Liners For Architectural Concrete:
1. Build of materials and in a manner that is sufficiently rigid and strong to withstand, without excessive deflection, movement, or leakage, high hydraulic pressures resulting from rapid filling and heavy-high frequency vibration.

2. Limit deflection in formwork to 1/360 of each component span and tolerances specified herein.
3. Lay out form joints in a uniform pattern or as shown.

D. Form Ties:
1. Locate on exposed surfaces in uniform pattern or as shown.
2. Construct so tie remains embedded in wall, except for removable portion at each end.

3.02 FORM TOLERANCES

A. General:
1. Surface, design, and construct forms to meet ACI 318 and the following minimum tolerances for specified finishes.
2. Failure of forms to produce specified tolerances will be grounds for rejection of concrete work. Upgrade concrete finish or replace to meet specification requirements.

B. Wall Tolerances:
1. Straight Vertical or Horizontal Wall Surface: Flat planes within tolerance as specified herein.
2. Surface Finish: As specified in Section 03300, Concrete.
3. Wall Type W-T1:
   a. Plumb within 1/4 inch in any 10 feet or within 1 inch in entire height from top to bottom for walls over 40 feet high.
   b. Depressions in Wall Surface: Maximum 5/16 inch when 10-foot straightedge is placed on high points in any direction or at any location.
   c. Wall Thicknesses: Maximum 1/4-inch minus or 1/2 inch plus from dimension shown.
4. Wall Type W-T2:
   a. Plumb within 1/4 inch in any 10 feet or within 1/2 inch in entire height from top to bottom for walls over 20 feet high.
   b. Depressions In Wall Surface: Maximum 1/8 inch when 10-foot straightedge is placed on high points in any direction or at any location.
   c. Wall Thicknesses: Maximum 1/4 inch minus or 1/2 inch plus from dimension shown.

C. Slab Tolerances:
1. Exposed Slab Surfaces: Comprise of flat planes as shown or as required within tolerances specified herein.

2. Slab Finish Tolerances and Slope Tolerances: Floor surface shall not have crowns so high as to prevent 10-foot straightedge from resting on end blocks, nor low spots that allow a block of twice the tolerance in thickness to pass under the supported 10-foot straightedge.
   a. Slab Type S-T1: Steel gauge block thicknesses shall equal 5/16 inch.
   b. Slab Type S-T2: Steel gauge block thicknesses shall equal 1/8 inch.
3. Slab Type S-F1 and S-F2:
   a. Finish Slab Elevation: Within 1/2 inch of elevation specified except slabs which are designed and detailed to drain to floor drain or gutter shall adequately drain regardless of tolerances.
   b. Repair floor slopes in an approved manner if necessary to provide complete drainage.
   c. Thickness: Maximum 1/4 inch minus or 1/2 inch plus from thickness shown.

D. Beams and Columns Tolerances:
   1. Exposed Straight Horizontal and Vertical Surfaces: Flat planes within specified tolerances.
   2. Beam Type B-T1:
      a. Physical Dimensions: Maximum 1/4 inch minus or 1/2 inch plus from dimension shown.
      b. Elevations: Within 1/2 inch plus or minus except where tops of beams become part of finished slab. In this case, refer to slab tolerances.
   3. Column Type C-T2:
      a. Physical Dimensions: Maximum 1/4 inch minus or 1/2 inch plus from dimension shown.
      b. Plumb within 1/4 inch in any 10 feet with maximum 1/2 inch out-of-plumb at top with respect to bottom.

E. Forms for Sidewalks and Driveways:
   1. Standard steel forms or wood forms constructed and fastened to prevent movement.
   2. Set forms to true lines and grades, and securely stake in position.

3.03 FORM SURFACE PREPARATION

A. Thoroughly clean form surfaces in contact with concrete of previous concrete, dirt, and other surface contaminants prior to coating surface.

B. Exposed Wood Forms in Contract with Concrete: Apply two full coats of specified form sealer.

C. Steel Forms:
   1. Sandblast or otherwise remove mill scale and other ferrous deposits from contact surface of forms.
   2. Coat contact surfaces of forms with release agent.
   3. Release Agent: Prevent discoloration of concrete from rust, and nontoxic after 30 days.

3.04 BEVELED EDGES (CHAMFER)

A. Form 3/4-inch bevels at concrete edges, unless otherwise shown.

B. Where beveled edges on existing adjacent structures are other than 3/4 inch, obtain Engineer's approval of size prior to placement of bevel form strip.

3.05 FORM REMOVAL

A. Contractor shall assume responsibility for damage resulting form improper and premature removal of forms.

B. Satisfy applicable OSHA requirements with regard to safety of personnel and property.

C. Leave forms and shoring for elevated structural slabs or beams in place in accordance with ACI 318, Chapter 6, and until concrete has reached compressive strength equal to specified 28-day compressive strength as determined by test cylinders.

D. Do not remove supports and reshore prior to obtaining adequate field cured cylinder results.

3.06 CONCRETE FINISHES

A. As specified in Section 03300, Concrete.

3.07 BACKFILL AGAINST WALLS

A. Do not backfill against walls until concrete has obtained compressive strength equal to specified 28-day compressive strength.

B. Place backfill simultaneously on both sides of wall, where, required to prevent differential pressures.

3.08 FIELD TESTS

A. Wall Finish Tolerances: Test for compliance with tolerances as specified.

B. Slab Finish Tolerances and Slope Tolerances:
   1. Floor flatness measurements will be made the day after floor is finished and before shoring is removed, to eliminate effects of shrinkage, curling and deflection
   2. Support 10-foot long straightedge at each end with steel gauge blocks of thicknesses equal to specified tolerance.
   3. Compliance with designated limits in four of five consecutive measurements is satisfactory unless obvious faults are observed.
   4. A check for adequate slope and drainage will also be made to confirm compliance with these Specifications.

3.09 MANUFACTURER'S SERVICES

A. Form Liner Manufacturer: Provide manufacturer's jobsite representative to assist with proper methods of application and use of form liner.

PART 4 – MEASUREMENT AND PAYMENT

4.01 LUMP SUM ITEMS

A. Payment for work in this Section will be included as part of the lump sum bid.

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Work includes furnishing, fabricating, and erecting all steel and fibers required for reinforcement of cast in place concrete as shown on the drawings.

B. Related Sections and Divisions:
1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Section 03300, Cast In Place Concrete.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

1.	ASTM A82	Steel Wire, Plain, for Concrete Reinforcement
2.	ASTM A185	Specification for Welded Steel Wire Fabric for Concrete Reinforcement.
3.	ASTM A615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

B. American Concrete Institute (ACI):

1.	ACI 315	Manual of Standard Practices for Detailing Reinforced Concrete Structures.
2.	ACI 318	Building Code Requirements for Structural Concrete.

C. Concrete Reinforcing Steel Institute (CRSI):
1. CRSI Manual of Standard Practice

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals:
1. Before proceeding with the fabrication of the reinforcement, submit shop drawings showing the number, size, length, bending and arrangement of the reinforcement.
2. All shop drawings shall be in accordance with ACI 315.
3. Quality control submittals, when requested shall consist of a certified copy of each heat analysis performed by producer and certified copies of reinforcement strength tests.

1.04 PRODUCT HANDLING

A. Delivery:
1. The reinforcement shall be delivered to the site bundled, tagged and marked.
2. Metal tags indicating the bar size, lengths, and other pertinent information corresponding to markings shown on placement drawings shall be used.

B. Storage:
   1. The reinforcement shall be stored at the site in a manner to prevent damage and accumulation of dirt and excessive rust.
   2. Protect reinforcing steel and welded wire fabric from surface contamination and from distortion.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Reinforcing bars shall comply with ASTM A615, Grade 60, deformed. Reinforcing bars required to be welded shall be ASTM A 706 low alloy.

B. Steel wire shall conform with ASTM A82, plain, cold-drawn steel.

C. Welded wire fabric shall comply with ASTM A 185, welded steel wire fabric.

D. Reinforcement supports including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcement shall be:
   1. Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar-type supports complying with CRSI manual.
   2. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
   3. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1) or stainless steel (CRSI, Class 2).
   4. When the supports bear directly on the ground and it is not practical to use steel bar supports, precast concrete blocks may be used to support the bottom lift of the reinforcement. The precast blocks must be solid and of a higher strength than the concrete being placed. The blocks must provide adequate support to the reinforcement and be of proper height to provide reinforcing cover. The use of face brick, hollow concrete block, rocks, wood or other unapproved objects will not be permitted.

E. Polypropylene fibers engineered and designed for secondary reinforcement of concrete slabs shall comply with ASTM C1116, Type III. Fibers shall be not less than ¾-inch long or greater than 1½-inch long as manufactured by Fibermesh or equal.

2.02 FABRICATION

A. General:
   1. Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances which comply with CRSI manual.
   2. In case of fabrication error, do not rebend or straighten reinforcement in a manner that will weaken the material.
   3. Unless otherwise noted, all end hooks dimensions shall conform with ACI standard hooks.

B. Reinforcement with any of the following defects will not be permitted:
   1. Bar lengths, depths, and bends exceeding the specified tolerances.

2. Bend or kinks not indicated on the drawings or final shop drawings.
3. Bars with reduced cross section due to excessive rusting or other causes.

C. Fabricate to dimensions shown on plans and ACI 318.

PART 3 - EXECUTION

3.01 PLACING REINFORCEMENT

A. General
Comply with the CRSI Manual's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.
1. Avoiding cutting or puncturing vapor retard/barrier during reinforcement placement and concreting operations. Repair damages before placing concrete.
2. Bars partially embedded in concrete shall not be field bent except as shown on the plans or permitted by the Engineer.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers.

D. Place reinforcement to maintain minimum coverages as indicated for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

F. Polypropylene fiber reinforcement for slabs may be used in lieu of WWF with engineer's approval. Use fiber reinforcement at a minimum rate of 1.5 pounds fiber per batch yard of concrete or greater if required by fiber manufacturer.

- END OF SECTION -

SECTION 03251

EXPANSION AND CONTRACTION JOINTS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section includes providing expansion and contraction in joints in cast-in-place concrete.

B. Related sections and divisions:
1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Section 03300, Cast-In Place Concrete.

1.02 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):
1. ASTM D1752 Spec. for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

B. American Concrete Institute (ACI):
1. ACI 302.1 Guide for Concrete Floor and Slab Construction

1.03 QUALITY ASSURANCE

A. Material Testing
1. Production testing.
   a. Contractor shall require the joint producer to perform the necessary testing of joint fillers to demonstrate conformity with applicable specifications.
   b. All costs associated with production testing shall be considered incidental to furnishing of joint filler and as such will not be paid for separately.
2. Field testing.
   a. The Contractor shall furnish all samples and shall afford such facilities as may be required for forwarding them for testing without charge to Owner.
   b. All laboratory costs associated with testing shall be paid for by Owner except as follows in which case they will be the responsibility of the Contractor.
      1) Failure of the material to meet the job specification, thus necessitating a retesting.
      2) Additional testing because of a change in material that may have previously been tested and accepted.
      3) Testing to be performed by an independent testing agency approved by Owner.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals:
1. Provide two (2) copies of producer's certification that supplied materials meet requirements of applicable specifications.
2. Materials.

a. Submit samples of each type of joint filler to be used, when requested by Owner's Representative.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Joint Fillers
   1. ASTM D1752, Type I and II as shown on the plans.

B. Expansion joints shall have ½-inch thick cork expansion joint filler meeting ASTM D1752 – Type 1 or 111 produced by W. R. Meadows, or equal.

C. Expansion joints in exterior concrete walks, slabs on grade, and other structures shall be ½-inch thick asphalt expansion joint filler meeting ASTM D994 produced by W. R. Meadows, or equal.

PART 3 - EXECUTION

3.01 EXPANSION JOINTS

A. Location and geometry of expansion joints shall be as shown on plans, or according to the following criteria.
   1. At right angle or tee intersections.
   2. At walkway and stoop intersections.
   3. Where walkways adjoin vertical surfaces.
   4. Where walkways adjoin existing pavements.
   5. Maximum spacing 100 feet unless otherwise noted on plans.
   6. At 300 feet intervals and points of radius on curb and gutter.

B. Extend filler full width and depth of concrete, with top slightly below finished surface of concrete.

3.02 CONTRACTION JOINTS

A. Location
   1. Locate contraction joints where shown on plans, or according to the following criteria for non-structural slabs:
      a. Floors.
         1) Column spacing 25 feet or less - maximum 25 feet spacing each way.
         2) Column spacing more than 25 feet - maximum 15 feet spacing each way.
         3) Joints shall be laid out from column to column with diamond shape at columns in center of floor or triangle at column at end of floor.
      b. Slabs on grade.
         1) Slab width 20 feet or less - use slab width as maximum allowable spacing.
         2) Slab width more than 20 feet - maximum 20 feet spacing each way.
      c. Locate no contraction joint less than 5 feet from any other joint.
      d. Locate joints to match like joints in previously constructed adjacent slabs.
         1) If joints are formed in section, there shall be no offsets or concrete struts between adjacent joints.

2) Take into consideration location of equipment bases and similar separately placed sections.
3) Unless shown otherwise on plans, joints shall not deviate more than five degrees from a right angle measured at intersecting joints and at slab edges.
4) No joint shall deviate more than ½ inch from a straight line.

2. Locate contraction joints every 10 lineal feet of curb and gutter.

B. Dimensions of Contraction Joints.
1. Depth.
a. Minimum 1 inch or 1/5 of slab depth, whichever is greater.
2. Width.
a. Minimum 1/8 inch for sawed joints, ¼ inch for other types.
b. Maximum ¼ inch for sawed joints, 3/8 inch for other types.

C. Criteria for Joint Selection.
1. Sealed joint.
a. Methods.
1) Tooled joint.
2) Strip-formed joint.
b. Use sealed joints only where shown on plans.
2. Open joint.
a. Methods.
1) Tooled joint.
2) Sawed joint, only where shown on plans.

D. Formation of Tooled Joints
1. Insert a metal parting strip into concrete after it has been struck off and consolidated, and while concrete is still plastic.
2. Remove strip when concrete is able to retain its shape.

E. Formation of Sawed Joints
1. Conform to ACI 302.1.
2. Saw joints as soon as practicable after concrete has set sufficiently to preclude raveling during sawing and before any shrinkage cracking takes place in concrete.

F. Formation of Strip-Formed Joints
1. Use plastic joint former with removable top portion.
2. Remove upper portion of strip, after concrete has sufficiently hardened, in such a manner as to prevent damage to surface of slab.

- END OF SECTION -

SECTION 03300

CAST-IN-PLACE CONCRETE--STRUCTURES

PART 1- GENERAL

1.01 SUMMARY

A. Work Included:
1. All cast-in-place concrete materials and work.
2. Concrete admixtures.
3. Formwork for cast-in-place concrete.
4. Cleaning and finishing of formed surfaces.
5. Required testing and submittals.

B. Related Sections and Divisions:
1. Applicable provisions of the General Conditions shall govern work in this section.
2. Section 01300, Submittals.
3. Section 03100, Concrete Form Work.
4. Section 03200, Concrete Reinforcement.
5. Section 03251, Expansion and Contraction Joints.
6. Section 03253, Waterstops.
7. Section 03310, Watertightness Test for Cast-In Place Concrete Tanks.
8. Section 03600, Grout.

1.02 REFERENCES

A. American Concrete Institute (ACI):

1.	ACI 211.1	Selecting Proportions for Normal and Heavy Weight Concrete.
2.	ACI 301	Specification for Structural Concrete for Buildings.
3.	ACI 302.1	Guide for Concrete Floor and Slab Construction.
4.	ACI 304	Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
5.	ACI 305	Hot Weather Concreting.
6.	ACI 306	Cold Weather Concreting.
7.	ACI 308	Standard Practice for Curing Concrete.
8.	ACI 309	Standard Practice for Consolidation of Concrete.
9.	ACI 318	Building Code Requirements for Reinforced Concrete.
10.	ACI 347	Recommended Practice for Concrete Formwork.

B. American Society for Testing and Materials (ASTM):

1.	ASTM C31	Making and Curing Concrete Test Specimens in the Field.
2.	ASTM C33	Concrete Aggregates.
3.	ASTM C39	Compressive Strength of Cylindrical Concrete Specimens.
4.	ASTM C42	Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
5.	ASTM C94	Ready-Mixed Concrete.
6.	ASTM C143	Test for Slump of Portland Cement Concrete.
7.	ASTM C150	Portland Cement.
8.	ASTM C158	Test for Water Retention by Concrete Curing Materials.

9. ASTM C171 Standard Specification for Sheet Materials for Curing Concrete.
10. ASTM C172 Standard Test Methods for Sampling Fresh Concrete.
11. ASTM C173 Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
12. ASTM C164 Test Methods for Temperature of Freshly-Mixed Portland Cement Concrete.
13. ASTM C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
14. ASTM C260 Air Entraining Admixtures for Concrete.
15. ASTM C309 Liquid Membrane-Forming Compounds for Curing Concrete.
16. ASTM C494 Chemical Admixtures for Concrete.
17. ASTM C618 Fly Ash and Raw or Calcified Natural Pozzolans for Using Portland Cement Concrete.
18. ASTM C1107 Packaged Dry, Hydraulic-Cement Grout (Non-shrink).
19. ASTM D994 Preformed Expansion Joint Filler for Concrete.
20. ASTM E329 Standard Recommended Practice for Inspection Testing Agencies for Concrete, Steel, and Bituminous Materials as used in Construction.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300, Submittals.

B. Submit the following information:
1. Gradation of fine and coarse aggregate – ASTM C33.
2. Specific gravity and dry rodded density of each aggregate.
3. Test of deleterious substances in fine and coarse aggregate – ASTM C33.
4. Design mix for all mixes.
5. 7 and 28-day compressive strengths for each concrete mix proposed.
6. Certified mill test results for cement identifying brand, type, and chemistry of cement.
7. Brand, type, principal ingredients and amount of each admixture.
8. Field quality control test results.

PART 2 - PRODUCTS

2.01 FORMWORK

A. Form work shall be as specified in Section 03100, Concrete Formwork.

2.02 PORTLAND CEMENT

A. Portland cement shall conform to ASTM C150 and shall be Type I. Type III may be used only when approved by the Engineer. All Portland cement shall be from one supplier and mill.

2.03 FLY ASH

A. Fly ash shall conform to ASTM C618, Class C or F. Loss on ignition shall not exceed 5 percent.

2.04 ADMIXTURES

A. No admixtures shall contain calcium chloride, thiocyanates or more than 0.05% chloride ions. Written certification of these requirements by the admixture manufacturer shall be submitted to the Engineer for approval with the mix design.

B. Air-Entraining Admixture

ASTM C260 for exterior permanently exposed normal weight concrete and for all vehicular use areas; 5% to 7.5% as measured with air meter conforming to ASTM C173 or ASTM C231.

C. Water-Reducing Admixture

Use ASTM C494 Type A. To be used unless noted. Chloride ion content of admixture shall not exceed chloride ion content of municipal drinking water and shall be limited to produce no detrimental effect on other components, such as metal deck, reinforcing, metal conduit, and shall be verified by supplier. Follow the manufacturer's recommendations. Products shall be equal to:

"Pozzolith 220 N", Master Builders
"WRDA 82", W. R. Grace

D. Water-Reducing Retarding Admixture

ASTM C494 Type D. Chloride ion content of admixture shall not exceed chloride ion content of municipal drinking water. Use only if acceptable to the Engineer. Products shall be equal to:

"Pozzolith 220 N", Master Builders
"Daratard 17", W. R. Grace

E. Non-Corrosive, Non-Chloride Accelerator

ASTM C494, Type C or E. Chloride ion content of admixture shall not exceed chloride ion content of municipal drinking water. Product shall have been subjected to long-term testing (3 years duration, minimum), using an acceptable accelerated corrosion test method such as that using electrical potential measures. Use only if acceptable to the Engineer. Products shall be equal to:

"Pozzutec 20", Master Builders
"Daraset 20", W. R. Grace

F. High Range Water Reducing Admixture (Superplasticizers)

ASTM C494 Type F or G. Chloride ion content of admixture shall not exceed chloride ion content of municipal drinking water and shall be limited to produce no detrimental effect on other components, such as metal deck, reinforcing, metal conduit, and shall be verified by supplier. Use only if acceptable to the Engineer. Products shall be equal to:

"Rheobuild 1000", Master Builders
"Daracem-100", W. R. Grace

2.05 WATER

A. Water shall be clean and free from deleterious amounts of acids, oils, alkali, organic matter and mineral substances.

2.06 WATERSTOPS

A. Polyvinyl chloride (PVC) waterstops shall be as specified in Section 03253.

2.07 CURING MATERIALS

A. Liquid Applied
   1. Liquid Membrane –Sonneborn Kure-N-Seal 25LV or equal. Apply upon completion of concrete finishing or form removal.

B. Sheet or Membrane
   1. Plastic film, ASTM C171:
      a. 10 mil thickness
      b. White during warm weather.
      c. Black during cold weather.
   2. Reinforced paper, ASTM C 17 1.
   3. Cotton mats, FS DDD-M-148.

2.08 CONCRETE SPECIALTIES

A. Vapor Barrier
   1. Vapor barrier shall be 6 mil polyethylene with joints lapped 6 inches and taped with a waterproof tape.

B. Bonding Agents
   1. Epoxy resin bonding compounds shall be Concresive liquid LPL for horizontal applications and paste LPL for vertical applications, as applicable and as manufactured by Adhesive Engineering; or Sikadur 32, Hi-Mod as manufactured by the Sika Chemical Corporation, or equal.
   2. Use of all bonding compounds shall be as shown on the drawings or as specified. Application shall be as recommended by the manufacturer.

C. Epoxy Anchoring System

Epoxy anchoring system shall be a two-part system thoroughly blended in a disposal mixing nozzle attached to the cartridge. Systems shall be Epcon by ITW Ramset, Anchor-It, or equal.

2.09 CONCRETE MIXES

A. Test Mixes
   1. Have an approved commercial testing laboratory prepare design mixes for each class of concrete specified for use on job.
      a. Design mixes in accordance with ACI 318 and ACI 211.1.
      b. Laboratory shall make, cure, and test all specimens required by the applicable standards.

c. Design job-mixed concrete on the basis of water - cement ratio.
d. Mixes shall be homogeneous, readily placeable, and uniformly workable.

2. Mixes shall conform to the following requirements:

Class	28-day Comp. Str. (PSI)	Max. Size Aggregate	ASTM C33 Aggregate	Min. Cement Content ** (Bags/C.Y.)	Air Content (%)*	Slump
A1	4000	1-1/2 inch	Size No. 4	5.5	5±1	3-inch - 4-inch
A2	4000	3/4 inch	Size No. 67	6.0	6±1	3-inch - 4 inch
A3	4000	3/8 inch	Size No. 8	6.0	7-1/2±1	3-inch - 4-inch
A4	4000	No. 16	Fine	7.0	8±1	6-inch Max.
B1	3000	1-1/2 inch	Size No. 4	4.5	5±1	3-inch - 4-inch
B2	3000	3/4 inch	Size No. 67	4.75	6±1	3-inch - 4-inch

*Required only where concrete is used for liquid containment or subject to freeze/thaw cycles.
**Minimum cement content applies to concrete in direct contact with earth or water.

3. When strength data from field experience or trial batches are not available, maximum permissible water-cement ratios shall be:
   a. Non-air-entrained:
      1) Class A: 0.44
      2) Class B: 0.58
   b. Air-entrained:
      1) Class A: 0.35
      2) Class B: 0.46
4. Maximum water/cement ratio when strength data from field experience or trial batches as required by ACI 318 are available:
   a. Class A: 0.44
   b. Class B: 0.58
5. Concrete which is to have a trowel-finished surface, maximum air content shall be 3%.
6. Fly ash may be substituted for cement on an equal weight basis up to a maximum of 20%.

B. Structural Concrete Mix Proportioning
1. Proportions of aggregate to cement shall be such as to produce a readily workable mixture with method of placement employed on job, but without allowing materials to segregate, or excess free water to collect on surface.
2. Combined aggregates shall be such that weight of fine aggregate shall not be less than 30 percent nor more than 45 percent of total.
3. Maximum size for coarse aggregate.
   a. Not larger than one-fifth of narrowest dimension between sides of forms.
   b. Not larger than one-third depth of slab.
   c. Not larger than three-fourths of minimum clear spacing between reinforcing bars.
   d. Not larger than 1-½ inch.

C. Concrete Usage
1. Class A4: Coating hardened concrete at construction joints, coating precast concrete plank prior to placement of bonded concrete topping, and optional first lift in forms with congested reinforcement and/or waterstop.
2. Class A: All locations except where Class B is specified.

3. Class B: Slabs reinforced with welded wire fabric, equipment bases, fence post footings, fillets in tanks, and where specifically stated in plans or specifications.

D. Mixing
1. Measure materials by weight in conformance with ASTM C94 and ACI 304.
2. Mix and deliver concrete in ready-mix equipment conforming to ASTM C94 and ACI 304.

PART 3 - EXECUTION

3.01 FORM WORK

A. Form work shall be as specified in Section 03100, Concrete Formwork.

3.02 INSTALLING EMBEDDED ITEMS

A. Encase pipes, anchor bolts, electrical conduits, steps, castings, and other inserts as shown on plans or as specified and finished by other trades.

B. Place inserts in advance of pouring and brace to prevent movement during pouring process.

C. Embedded conduits and pipes shall not be larger in outside dimension than one-third the overall thickness of wall, beam or slab.

D. Embedded conduits and pipes shall not be spaced closer than 3 diameters or widths on center.

3.03 PLACEMENT OF CONCRETE

A. Environmental Requirements
1. Hot weather concreting.
   a. Follow ACI 305 whenever mean surrounding air temperature equals or exceeds 80 degrees F (27 degrees C).
   b. Do not place concrete whenever air temperature equals or exceeds 90 degrees F (32 degrees C).
2. Cold weather concreting.
   a. Follow ACI 306 whenever mean surrounding air temperature is below 40 degrees F (4.5 degrees C).
3. Do not place concrete during rain, sleet, or snow, unless protection is provided.

B. Placement of Concrete
1. Conveying concrete.
   a. Convey concrete from mixer to place of final deposit by methods that will prevent separation or loss of materials.
   b. Equipment for chuting, pumping, or pneumatically conveying concrete shall be capable of providing a supply of concrete at site of Work without separation of ingredients and without interruptions sufficient to permit loss of plasticity between successive placements.
   c. Unless otherwise approved, conform to ACI 304.
2. Depositing concrete.

a. Deposit concrete as nearly as practicable to its final position to avoid segregation due to rehandling or flowing to its final position. Concrete shall not be dropped more than 6 feet unless a suitable chute or tube is used.
b. Carry on concreting at such a rate that concrete is at all times plastic, and flows readily into spaces between reinforcing.
c. Do not deposit concrete that has partially hardened or that has been contaminated by foreign materials.
d. Do not use retempered or remixed concrete.
e. After concreting is started, it shall be carried on as a continuous operation until placing of a panel or section is completed.
f. Top surfaces of vertically formed lifts shall be generally level.
g. Thoroughly consolidate concrete by suitable means during placement, and thoroughly work concrete around reinforcement and embedded fixtures, and into corners of forms.
h. Vibrators may be used to aid placement, provided they are used under experienced supervision and forms have been designed to withstand their action.
i. Unless otherwise approved, conform to ACI 304.

3.04 CONSTRUCTION JOINTS

A. Construction joints shall be located as shown on plans, or if not located, locate so as to not impair strength and appearance. Construction joints shall be perpendicular to main reinforcement and reinforcement shall be across the joint.

B. Clean surface of hardened concrete and remove laitance and standing water. Roughen surface of concrete to 1/4-inch amplitude.

C. Wet construction joints and coat with Class A4 concrete immediately before new concrete placement.

3.05 CURING

A. Maintain concrete surfaces moist for the first 7 days after placement.

B. Under hot weather conditions, conform to ACI 305.

C. Under cold weather conditions, conform to ACI 306.

D. When a liquid-membrane-forming compound is used, protect exposed steel, key-ways or concrete to be surfaced from curing compound.

E. During curing period, protect concrete from damaging mechanical disturbances, water flow, loading, shock, and vibration.

F. Formed Surfaces
1. Ceilings, walls, columns and beam sides may be cured by leaving forms in place, by wet cure, or by use of a liquid curing compound.
a. Spray surface of forms left in place during curing period as frequently as drying conditions may require to keep concrete surfaces moist. For vertical surfaces,

apply water to run down on inside of forms, if necessary, to keep concrete surfaces moist.

b. Apply liquid curing compound immediately after form removal. Apply at rate recommended by manufacturer.

G. Slabs (Flatwork)

1. Start curing activities as soon as free water has disappeared from surface of concrete after placing and finishing.
2. Wet cure slabs, which are to be covered with bonded concrete topping.
3. Cure other flatwork using a liquid curing compound or wet cure.
   a. All floor surfaces shown in the room finish schedule to be exposed concrete shall receive 2 coats of sealing and hardening compound applied in strict accordance with manufacturers recommendations. The first coat is applied upon completion of finishing the concrete. The second coat is applied upon completion of final cleanup. All areas shall be clean and free from laitance, dust, grease or oil. Contractors shall verify compatibility of sealing-hardening compound with any previously applied curing compounds. All floor surfaces to receive finishes shall be water cured.

3.06 CONCRETE WALL FINISHES

A. Type W-1:

1. Fill snap-tie holes with non-shrink, non-metallic grout.
2. Knock off projections.
3. Patch honeycomb areas and rock pockets. Small air holes (less than 1/2 inch) do not require patching.

B. Type W-3:

1. Fill snap-tie holes with approved non-shrink, non-metallic color matched grout.
2. Grind off projections, fins, and rough spots.
3. Repair other defects such as honeycomb areas, rock pockets, and rough spots resulting from form release agent failure or other reasons with color matched non-shrink grout.
4. Where surfaces are required to be painted as shown on the painting schedules, the surfaces shall be sandblasted in addition to steps 1 through 3.

C. Type W-4, Rubbed Wall Finish:

1. Only water curing will be permitted on walls being rubbed unless an approved dissipating curing compound is approved.
2. Grind off projections, fins, and rough spots.
3. Repair defects such as honeycomb areas, rock pockets, and rough spots resulting from form release agent failure or other reasons.
4. Perform rubbing immediately upon completion of curing operation, and finish no later than 5 days after curing has been completed.
5. The mortar shall be a mixture of cement and silica sand in proportions used in concrete being finished.
   a. Spread mortar uniformly over entire surface using a sponge float, filling air voids and imperfections level with adjacent concrete surface. It is the intent to provide a light texture finish on the concrete surface without "plastering" the surface. Finish wall uniformly by floating in a circular motion or pattern.

D. Type W-5, Abrasive Blast – Sandblast:
   1. Intent of this procedure is to remove surface skin to a depth no more than 1/16 inch, and expose only fine aggregate and air holes near the surface, thus producing a uniform texture and matching approved sample or mockup panel.
   2. Perform sandblasting within 7 days after end of curing period of concrete.
   3. Sandblast areas at same age or within +2 days of same age.
   4. The same person shall accomplish sandblasting on one structure.
   5. Abrasive: Use clean silica sand free of foreign material sand supplied in sealed sacks.
   6. Blast surface with 100 psi air pressure at rate of 2 to 3 square feet per minute with nozzle held approximately 2 feet from surface and perpendicular thereto.
   7. Modification of procedure will acceptable if proven on sample and mockup panel.

3.07 CONCRETE SLAB FINISHES

A. General:
   1. Do not excessively use "jitterbugs" or other special tools designed for the purpose of forcing coarse aggregate away from the surface and allowing a layer of mortar to accumulate.
   2. Do not dust surfaces with dry materials.
   3. Thoroughly compact slabs and floors by vibration.
   4. Round off all edges of slabs and tops of walls with a steel edging tool, except where a cove or chambered finish is shown. Steel edging tool radius shall be 1/4-inch for all slabs subject to wheeled traffic.
   5. After applying the final floor finish and after curing as specified in Section "Curing," cover slabs with Visqueen or other material to keep floor clean and protect it from material and damage due to other construction work.

B. Type S-1, Concrete Slab Finish Steel Troweled Finish:
   1. Finish by screeding and floating with straightedges to bring surfaces to required finish elevation shown.
   2. While concrete is still green, but sufficiently hardened to bear a person's weight without deep imprint, float to true, even plane with no coarse aggregate visible.
   3. Use sufficient pressure on floats to bring moisture to surface.
   4. After surface moisture has disappeared, trowel concrete to produce smooth, impervious surface, free from trowel marks.
   5. Burnish surface with an additional troweling. Final troweling shall produce a ringing sound from trowel.
   6. Do not use dry cement or additional water during troweling. Excessive troweling will not be permitted.
   7. Power finishing:
      a. An approved power machine may be used in lieu of hand finishing for finishing concrete floors and slabs in accordance with directions of machine manufacturer.
      b. Do not use power machine when concrete has not attained the necessary set to allow finishing without introducing high and low spots in slab.

C. Type S-2, Slab Finish Float:
   1. Finish slabs to receive fill and mortar setting beds by screeding with straightedges to bring surface to required finish plane.
   2. Float slab to compact and seal surface.

3. Remove all laitance and leave surface clean.

D. Type S-3, Ceilings:
   1. When forming is removed, grind off projections on underside of slab, repair rock pockets and honeycomb area defects including small shallow air pockets.
   2. If underside of slab is exposed to view finish as per W-4 or W-5.

E. Type S-6, Sidewalk & Exterior Slab Finish:
   1. Slope walks down 1/4 inch per foot away from structures, unless otherwise shown.
   2. Strike off surface by means of strike board and float to a true plane.
   3. Broom surface at right angles to direction of traffic.
   4. Lay out surfaces in blocks with an approved grooving tool sawcut as shown or as directed by Engineer.

F. Type S-7 for Clarifier
   1. Finish.
   2. Provide coarse broom finish for grout as specified or Section 03600, Grout.

G. Concrete Curb:
   1. Grade subgrade to proper elevation and compact.
   2. Securely stake and brace forms to true line at proper elevation.
   3. Place concrete as hereinbefore specified.
   4. Float top surface of curb smooth, and finish all discontinuous edges with steel edger.
   5. After concrete has taken its initial set, remove front form and give exposed surfaces an S-6 finish.

3.08 CONCRETE FINISHES

A. General
   1. Every type of concrete finishes and finish tolerances are listed even though some of the finishes are not used in this project so that the Contractor can see by comparison how each of required finish fits into the progressive finishes.

B. Schedule of Concrete Finishes: The following schedule of concrete finishes is not intended to cover all areas of concrete finish, but to show some of the major areas of different types of finishes and tolerances.

SCHEDULE OF CONCRETE FINISHES

Area	Type of Finish	Required Form Tolerances
EXTERIOR WALL SURFACES		
Above grade when using a form liner (above a point 6" below finish grade)	W-5	W.B.
Above grade (above a point 6" below finish grade)	W-4	W.B.
Backfilled (below a point 6" below finish grade)	W-1	W.A.
INTERIOR WALL SURFACES		
Wet wells, basins, channels, and tanks	W-3	W.A.
Interior building walls	W-4	W.A.
EXTERIOR SLABS		
Roof slab (exposed and traffic use)	S-6	S.B.
Roof slab (backfilled above)	S-2	S.A.
Sidewalks, exterior slabs	S-6	S.A.
Stairs treads and landings	S-6	S.B.
INTERIOR SLABS		
Floor slab (building)	S-1	S.B.
Wet well, aeration basin, and channel	S-1	S.A.
Clarifiers	S-7	S.A.
Stairs and landings	S-6	S.A.
Ceilings	S-3	S.A.
BEAMS AND COLUMNS		
Beams	B-1 or B-2	B.A.
Columns	C-1 or C-2	C.A.
MISCELLANEOUS SURFACES		
Curbs	S-6	W.A.
Equipment pads (interior and exterior)	S-1 Horizontal Surfaces W-4 Vertical Surfaces	S.A.
Non-accessible wall surfaces	W-1	W.A.

3.09 BEAMS AND COLUMN FINISHES

A. Type B-1:
   1. Knock off all fins and projections.
   2. Repair all rock pockets and honeycomb areas.

B. Type B-2; exposed to view
   1. Grind beams to remove all form marks.
   2. Repair all rock pockets and honeycomb areas.
   3. Finish as per type W-4.

C. Type C-1:
   1. Knock off all fins and projections.
   2. Repair all rock pockets and honeycomb areas.

D. Type C-2; Exposed to view

1. Grind column to remove all form marks.
2. Repair all rock pockets and honeycomb area.
3. Finish as per type W-4.

3.10 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. Sampling and testing for quality control during concrete placement shall conform to ASTM E329 and shall include the following:

1. Sampling Fresh Concrete: ASTM C172, except modified for slump to comply with ASTM C94.
   a. Slump: ASTM C143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
   b. Air Content: ASTM C173, volumetric method for lightweight or normal weight concrete; ASTM C231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
   c. Concrete Temperature: ASTM C1064; one test hourly when air temperature is 40 degrees F (4 degrees C) and below, when 80 degrees F (27 degrees C) and above, and one test for each set of compressive-strength specimens.
   d. Compression Test Specimen: ASTM C31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
   e. Compressive-Strength Tests: ASTM C39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch, if fewer than five are used.
3. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
4. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.

B. Test results will be reported in writing to Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.

C. Nondestructive Testing
Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

D. Additional Tests
The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods as directed.

E. The cost of testing services shall be included in the lump sum base bid price.

3.11 WATER TEST

A. Refer to Section 03310, Watertightness Test for Cast-In Place Concrete Tanks for testing requirements.

B. The structure has failed the test when any of the performance requirements of Section 03310 are not met. The structure failing the test shall be repaired and re-tested.

C. Properly dispose of water used for testing at the Contractor's expense.

3.12 REPAIR OF LEAKS

A. If leaks are observed, they shall be repaired as follows:
1. Locate and mark leaking areas.
2. The leaking areas shall be inspected for recommendations by a representative of a manufacturer that specializes in concrete repair systems.
3. Recommendations shall be submitted for approval of the type of concrete repair method required to correct the leaking areas for the life of the tank.
4. Upon approval of the concrete repair methods and materials, repair the leaking areas accordingly.
5. After repair, the structure shall be re-tested as above. Testing and repair shall continue until all leaks or moist spots have disappeared to the satisfaction of the Engineer.

- END OF SECTION -

SECTION 03303

CAST-IN-PLACE CONCRETE – STREET WORK
PAVEMENT, CURB AND GUTTER, SIDEWALK, AND DRIVEWAY

PART 1 – GENERAL

1.01 SUMMARY

A. Work Included: This section provides cast-in place concrete for street work.

B. Related Sections and Divisions:
1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Section 02201, Earthwork Roadway Construction.
4. Section 02235, Crushed Aggregate Basecourse.
5. Section 03200, Concrete Reinforcement.
6. Section 03251, Expansion and Contraction Joints.
7. Section 03304, Colored and Stamped Concrete.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM).

1.	ASTM A185	Specification for Welded Steel Wire Fabric for Concrete Reinforcement.
2.	ASTM C31	Making and Curing Concrete Test Specimens in the Field.
3.	ASTM C33	Specification for Concrete Aggregates.
4.	ASTM C39	Test for Compressive Strength of Cylindrical Concrete Specimens.
5.	ASTM C94	Specification for Ready-Mixed Concrete.
6.	ASTM C143	Test for Slump of Portland Cement Concrete.
7.	ASTM C150	Specification for Portland Cement.
8.	ASTM C172	Sampling Fresh Concrete.
9.	ASTM C231	Test for Air Content of Freshly Mixed Concrete by the Pressure Method.
10.	ASTM C309	Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
11.	ASTM D1557	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-Lb (44.5-N) Rammer and 18-in. (457 mm) Drop.
12.	ASTM D1751	Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Type).
13.	ASTM E329	Standard Recommended Practice for Inspection Testing Agencies for Concrete, Steel, and Bituminous Materials Used in Construction.

B. American Concrete Institute (ACI).
1 ACI 304 Institute ACI Measuring, Mixing, Transporting, and Placing
2. ACI 305 Concrete, Recommended Practice for Hot Weather.
3. ACI 306 Concreting, Recommended Practice for Cold Weather.
4. ACI 347 Concreting, Recommended Practice for Concrete Formwork.

C. State of Wisconsin Department of Transportation, Division of Highways; Standard Specifications for Highway and Structure Construction, latest edition.

1.03 SUBMITTALS

A. Submit shop drawings and test reports in accordance with Section 01300, Submittals

B. Submit the following information:
1. Concrete Mix Design.
2. Gradation of fine and course aggregate – ASTM C33
3. Test of deleterious substances in fine and course aggregate – ASTM C33
4. Specific gravity and dry rodded density of each aggregate.
5. 7-day and 28-day compressive strengths for each concrete mix proposed.
6. Certified mill test results for cement identifying brand, type, and chemistry of cement.
7. Brand, type, principal ingredients, and amount of each admixture.
8. Field quality control results.

1.04 QUALITY ASSURANCE

A. Contractor shall contract with an established independent testing agency to provide testing services as follows:
1. Material Acceptance Testing:
   a. Design mix.
2. Installation Testing:
   a. Slump.
   b. Air-entrainment.
   c. Compressive strength test.
3. Additional Testing:
   a. Perform under following circumstances:
      1) Material failure.
      2) Change in ready-mix source.
      3) Design mix changes requested by Contractor.

B. The following shall be in accordance with the stated references:
1. Inspection and Testing: ASTM E329.
2. Sampling: ASTM C172.
3. Slump: ASTM C143.
4. Air-Entrainment: ASTM C231.
5. Compressive Strength Test: ASTM C31 and C39.

C. Perform slump, air entrainment, and compressive strength tests required by this section with the following frequency:
1. Two tests daily or one per 100 cubic yards placed, whichever number is greater.

D. Compressive strength test shall consist of four standard test cylinders made from a single batch of concrete:
1. Test one cylinder at 7 days.
2. Test two cylinders at 28 days.
3. Remaining cylinder shall be tested in the event prior tests fail.

4. Compressive strength tests shall be considered satisfactory when 28-day tests meet the following:
   a. Test results equal or exceed specified compressive strength.
   b. No individual test falls more than 500 psi below specified compressive strength.
5. Failure of compressive strength tests shall result in following additional testing:
   a. Provide two core samples of each portion of work affected and perform compressive strength tests.
   b. Replace work if core samples do not equal or exceed specified compressive strength.
6. When the testing results show that the work is of an acceptable nature, the acceptance of the work shall not relieve the Contractor from making corrections to the tested work during the warranty period.

E. Test results will be reported in writing to Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.

F. Nondestructive Testing
Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

G. Additional Tests
The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods as directed.

H. The cost of testing services shall be included in the lump sum base bid price.
1. Submit two (2) copies of the composition and strength testing results for design mix.

PART 2 - PRODUCTS

2.01 CEMENT

A. Portland cement shall be Type I, Type II, or Type III Portland Cement conforming to the requirements of ASTM Designation C150 or Type IA, Type IIA, or Type IIIA Air-Entraining Portland Cement conforming to the requirements of ASTM Designation C175.

2.02 AGGREGATE

A. Aggregate shall conform to ASTM C33.

B. Aggregate shall consist of clean, hard, durable sand and crushed rock, crushed gravel, or gravel. Coarse aggregate shall meet the grading requirements for size No. 57, 67 or 467 (Wis/DOT Standard Size No. 1 or mixture of Size No. 1 and 2). Ratio of coarse aggregate to fine aggregate shall not be less than 1: 1 nor more than 2: 1.

2.03 AIR-ENTRAINING ADMIXTURE

A. Air-Entraining Admixture shall conform to ASTM C260.

2.04 WATER-REDUCING, SET-CONTROLLING ADMIXTURES

A. Water-Reducing, Set-Controlling Admixtures shall conform to ASTM C494, Type A for water-reducing, Type D for water-reducing and retarding, and Type E for water-reducing and accelerating.

2.05 CURING COMPOUND

A. Curing Compound shall be ASTM C309, Type 2; resin, white pigmented.

2.06 REINFORCEMENT BARS

A. All reinforced concrete to meet or exceed the minimum requirements of ACI 318.

B. Reinforcement shall conform to Section 03200 Concrete Reinforcement.

C. Reinforcement shall be ASTM A615, Grade 60.

D. Fabric shall be 6 inches by 6 inches – W2.0 x 2.0 WWF

E. Polypropylene fibers shall comply with ASTM C1116, Type III.

2.07 EXPANSION JOINT

A. Expansion joints shall conform to Section 03251, Expansion and Contraction Joints.

B. Thickness shall be 1/2-inch.

2.08 MIX DESIGN

A. Concrete mixes shall be designed on the basis of compressive strength by methods specified in ACI 211.1, ACI 318, and ASTM C94 containing no less than the specified minimum cement content. Concrete mix designs complete with sample test results shall be submitted to the Engineer for approval prior to placing any concrete.

2.09 CONCRETE CLASSES

A.

Classes	A	B	C	D
Minimum compressive strength (psi)	28-day 4,000	28-day 2,000	28-day 3,000	3-day 2,000
Minimum cement (bags/c.y.)	6	4.5	5.5	7
Air content, (%) by volume	6 ±1.5	2-4	2-4	6 ±1.5
Maximum slump (inches)	3	4	4	3
Use	Pavements, curbs, walks, structures, end walls	Pavement base, cradles & inlet walls	Manhole bases,	High early strength special const.

Note: Slip formed concrete shall contain 7.0% air entrainment ±1.5%.

B. Contractor may submit for approval alternate mix designs for non-water retaining concrete. Compressive strength of mix shall be verified. Contractor shall be responsible for removing and replacing all concrete not meeting required compressive strength.

C. Maximum aggregate size ¾-inch.

2.10 ADMIXTURES

A. Admixtures may be added to achieve a desired result provided such admixture does not adversely affect strength and durability of the concrete.

B. Calcium chloride will not be permitted.

PART 3 - EXECUTION

3.01 BATCHING

A. During hot weather, the temperature of the concrete shall be less than 90°F. Work shall be in accordance with ACI 305, "Recommended Practice for Hot Weather Concreting."

B. During cold weather, no frozen materials or materials containing ice shall be used. Temperatures of materials, including mixing water, shall not exceed 140°. When placed in forms the concrete shall have a temperature between 50°F and 90°F. Work shall be in accordance with ACI 306, "Recommended Practice for Cold Weather Concreting."

3.02 MIXING AND DELIVERY

A. Ready-mixed concrete shall be mixed and delivered in accordance with ASTM C94 and ACI 304. The production facilities shall comply with the requirements of the National Ready Mixed Concrete Association Certification Plan as regards materials storage and handling, batching equipment, central mixer, truck mixers, agitators, non-agitating units, ticketing system, etc.

B. Concrete shall be delivered to the site of the work and the mixed concrete discharged completely within 1-1/2 hours after water has been added to cement. In hot weather, or under conditions contributing to quick stiffening of concrete, this time may be reduced by the Engineer.

C. No water shall be added on the job unless authorized by the Engineer; the amount of water, if added, shall be recorded on all copies of the delivery ticket hereinafter required. If water is permitted to be added to mixed concrete upon arrival at the job, an additional mixing of 30 revolutions of the drum shall be required.

D. Concrete delivered shall arrive at the site having a temperature not less than 50°F nor greater than 90°F unless otherwise permitted by the Engineer.

3.03 DELIVERY TICKETS

A. With each load of concrete delivered to the job there shall be furnished by the ready-mixed concrete producer duplicate delivery tickets, one for the Contractor, and one for the Engineer/Architect. Delivery tickets shall provide the following information:
   1. Date and serial number of ticket;

2. Name of ready-mixed concrete plant;
3. Job location;
4. Contractor;
5. Type and brand name of cement;
6. Mix number or specified cement content in bags per cubic yard of concrete;
7. Truck number;
8. Time dispatched stamped by a time clock;
9. Amount of concrete in load in cubic yards;
10. Admixtures in concrete, if any;
11. Maximum size of aggregate;
12. Water added at job, if any;
13. Slump of concrete ordered

3.04 PREPARATION OF THE SUBGRADE

A. Excavate subgrade to line and grade shown on plans and details.

B. Thoroughly compact the subgrade and finish to a trim surface. All soft or unsuitable material shall be removed and replaced with specified materials.

C. Provide crushed aggregate base course to thickness as shown on the plans and details.

D. Compact to minimum 95 percent Modified Proctor density, ASTM D1557.

E. Surplus material may be used in fill areas.

F. Excess material shall be disposed at a site provided by Contractor.

3.05 FORMING

A. Conform to ACI 347.

B. Forms shall result in a final structure that conforms to shapes, lines, and dimensions of slabs as required by plans and specifications.

C. Forms shall be properly braced to maintain position and shape.

D. Clean and coat forms with clear, non-staining mineral or paraffin base form oil.

E. Reinforcement, forms, and ground with which concrete will be in contact shall be free from frost and debris.

F. Soak subgrade before placement of concrete slabs on grade.

G. Remove laitance and other unsound material before additional concrete is placed against hardened concrete.

H. Have equipment on hand to protect newly placed concrete from rain, freezing, and hot weather until it has hardened sufficiently to resist damage.

I. Unless noted otherwise, furnish the following minimum thicknesses:
   1. Sidewalks: 4-inch
   2. Driveways and sidewalks through driveways: 6-inch

3.06 SLIP FORMING

A. Coordinate mixing, delivering, and placing of the concrete to provide a uniform progress with the stopping and starting of the machine held to a minimum.

B. Slip form machine shall be capable of placing the specified concrete section with an adequate amount of vibration to preclude the possibility of honeycomb formation.

3.07 PLACING

A. Contractor shall notify Engineer of concrete placing schedule one day in advance of pour to allow for inspection of reinforcing and forms.

B. Once placing operation commences, it shall be carried out as a continuous operation until a section is completed.

C. Placing should be carried on in such manner that the concrete in the form is still plastic and can be integrated with fresh concrete.

D. Concrete shall not be placed in water. Water level shall be removed or lowered in a manner approved by Engineer.

E. Concrete shall be placed before initial set has occurred. Excess water will not be permitted. Powdering a mixture with cement to absorb excess water will not be permitted.

F. Dump trucks may be used for transporting mixed concrete to the desired location. If segregation of the concrete becomes evident, the use of dump trucks will not be permitted.

G. Where chutes are used to transport concrete, they shall be of metal or wood with metal lining. They should have a slope not exceeding one vertical to two horizontal and not less than one vertical to three horizontal so that the concrete will travel fast enough to keep the chute clean but slow enough to avoid segregation of materials. The end of each chute shall be provided with a baffle to help prevent segregation, or the concrete should be discharged through a tremie or elephant trunk directly into the form.

H. Concrete shall not fall freely more than 4 feet. Elephant trunks and/or tremies shall be used to prevent free fall of the concrete.

I. Concrete shall be deposited in approximately horizontal layers not to exceed 18 inches in height to avoid segregation due to re-handling and flowing.

J. Pumping equipment shall be of suitable type, without Y-sections, and with adequate pumping capacity. Loss of slump in pumping shall not exceed 1-1/2 inches.

K. The concrete shall be thoroughly compacted by means of an approved vibrator, with the period of vibration being not less than 2 seconds nor more than 5 seconds at any one point.

3.08 PLACEMENT OF DETECTABLE WARNING FIELDS

A. Physical characteristics of the concrete shall be consistent with the contract specifications.
   1. Concrete shall be poured and finished, to required dimensions and slope prior to placement.
   2. Cast-in-place tiles shall be tamped or vibrated into fresh concrete to ensure field of tile is flush to the adjacent concrete surface and all voids under tile are filled. Maximum tolerance for elevation differences between tile and adjacent surface is 1/16".
      a. Concrete shall be troweled around the tile perimeter to the field level of the tile.
      b. Following placement and approved placement slope and location, before the concrete sets two suitable weights of 25 lbs each shall be placed on each tile to ensure solid contact to concrete.
      c. Following curing of concrete, protective plastic wrap shall be removed from the tile face.

3.09 PLACEMENT OF HANDICAP RAMPS

A. Place handicap ramps where shown on plans or as directed by Owner's Representative.

3.10 FINISHING

A. Finish concrete true to required level and grade to a tolerance of:
   1. True plane within ¼-inch in 10 feet.

B. Float as follows:
   1. Tamp concrete for force aggregate away from surface.
   2. Screed with straight edges and bring to required line.
   3. Float surface to a true and uniform plane with no coarse aggregate visible.
   4. Do not dust surface with dry materials to remove excess water.

C. Broom at right angles to traffic.

D. Face surfaces of the curb and gutter shall be troweled and finished smooth.

E. Round exposed edges with an edger having ¼-inch radius.

F. Point honeycombed areas with mortar composed of three parts sand and one part Portland cement immediately after the curb and gutter has been placed.

3.11 ENVIRONMENTAL REQUIREMENTS

A. Follow ACI 305 whenever mean surrounding air temperature equals or exceeds 80°F (27°C).

B. Do not place concrete whenever air temperature equals or exceeds 90°F (32°C).

C. Follow ACI 306 whenever mean surrounding air temperature is below 40°F (4.5°C).

D. Do not place concrete during rain, sleet, or snow unless protection is provided.

3.12 EXISTING CONCRETE FLATWORK

A. When abutting to existing flatwork, provide the following:
   1. Saw cut existing concrete at construction limits.
   2. Install expansion joints between existing and new construction.

3.13 CONTRACTION JOINTS

A. Sawcut curb and gutter at 10-foot intervals to a minimum depth of 2 inches.

B. For sidewalks, use sidewalk width as maximum spacing or 5 feet, whichever is greater. Do not use less than 3 feet or greater than 12 feet of spacing.

C. Sawcut pavement as shown on the pavement joint details.

D. Saw joints as soon as practical after concrete has set sufficiently to preclude raveling during the sawing and before any shrinkage cracks occur.

3.14 EXPANSION JOINTS

A. Place as follows:
   1. 300 foot maximum spacing on tangent sections curb and gutter and sidewalk.
   2. Where radial curb and gutter meet tangent sections.
   3. Adjacent to existing joints in abutting concrete paving.
   4. Place at right angles to the flowline and surface of the gutters.
   5. Expansion joint material shall be one piece and extend the full depth and width of the curb and gutter or concrete section.
   6. Place expansion joint in pavement sections as shown on the plans and details.

3.15 REINFORCEMENT BARS

A. Provide (2) #4 bars when continuously reinforced curb and gutter is specified.
   1. Place bars continuous from catch basin to catch basin, and terminate bars on top of casting flange.
   2. Splices shall lap a minimum of twelve inches and shall be wire tied.
   3. Support bars such that they are held firmly in place and are 3 inches above bottom of curb and gutter.

B. Place reinforcement and dowel bars for pavement sections as shown on the plan details.

3.16 RESTORATION

A. Backfilling
   1. Backfill low areas with soil that meets Engineer's prior approval.
      a. Between concrete structure and property line.
      b. Shape to line and grade to permit landscaping.

B. Landscape areas disturbed by construction in accordance with section: "Landscaping."

C. Contractor shall be responsible for all trees and shrubs damaged during construction and will be obligated to make restitution for said damage.

D. If Contractor fails to complete restoration or provide maintenance prescribed, the Owner reserves the right to complete this work and deduct it from moneys due.

3.17 CURING AND PROTECTION

A. Use a white pigmented curing compound conforming to ASTM C309, Type 2.

B. Hot Weather Conditions: Conform to ACI 305.

C. Cold Weather Conditions: Conform to ACI 306 & WisDOT Standard Specifications Latest Edition 415.3.15.2 Protection Covering.

D. During curing period, protect concrete from damaging mechanical disturbances, water flow, loading, shock, and vibration.

PART 4 MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Cast-in-place concrete - street work shall be paid for at the bid price in accordance with one of the following methods, unless indicated otherwise in the Bid Form.
   1. Cast-in-Place Concrete - Street Work. Unit Price. When so provided, payment for cast-in-place concrete-street work shall be made at the contract unit price bid as specified for concrete pavement, curb and gutter, concrete sidewalk, steps and driveways.
      a. Payment for cast-in-place concrete - street work shall include all base preparation and grading as specified for concrete pavement, curb and gutter, concrete sidewalk, steps and driveways.
      b. Payment for cast-in-place concrete - street work shall include minimum compacted thickness of base course and sub base course material as specified for pavement, concrete curb and gutter, concrete sidewalk, steps and driveways.

B. Measurement
   1. Measurement shall be made along the edge of concrete for pavement, sidewalks, and driveways. Square feet will be calculated based on actual length and width. Irregular shaped areas will be calculated based on average length and width.
   2. Lineal measurement shall be made in the flow line for curb and gutter.

C. Payment
   1. Payment shall be made at the unit price per square feet or per lineal as indicated in the bid schedule.
   2. Unit price shall include:
      a. Removal of existing.
      b. Foundation preparation.
      c. Forming.
      d. Placing and finishing concrete.
      e. Labor, equipment and material.

D. Detectable warning field shall be paid for at the contract unit price.

E.. Adjusting utility appurtenances in or adjacent to concrete pavement, curb and gutters, sidewalks, steps, driveways and retaining walls will be considered inclusive to payment for work associated with concrete pavement, curb and gutter, sidewalks, steps, and driveway construction and no additional compensation will be allowed unless indicated in the Bid Form.

- END OF SECTION –

SECTION 03600

GROUT

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. This section covers the work necessary to furnish and install, complete, grout as specified herein.

1.02 SUBMITTALS

A. Quality Control Submittals: Furnish the following:
   1. Non-shrink Grout, Types I, II, and III, as applicable and other grout specified. The epoxy grout specified herein shall be considered as repair grout. Grout test reports transmitted directly from testing laboratory to Engineer for the following:
      a. Test results and service report from demonstration tests and from testing throughout project duration as specified.
      b. Grout mix designs for grout other than non-shrink grout.
      c. Certified trial mix laboratory test reports for each mix design on grout other than non-shrink grout.
      d. Certified cylinder test results from laboratory mixes for growth other than non-shrink grout.
      e. Gout test results for grouts proposed to be used other than as specified herein.
      f. Slab Finish: Placement procedures and sequence.

B. Contract Closeout Submittals:
   1. Manufacturer's Certification of Installation, including manufacturer's job service report, certifying grouts were used in accordance with manufacturer's recommendations.

1.03 QUALITY ASSURANCE

A. Pre-installation demonstrations for Non-shrink Grout: Provide the following:
   1. Demonstration(s): Working session(s) where non-shrink grout is mixed to specified consistency, tested, placed, and curing initiated, as specified below, to provide actual on-the-job training for Contractor, Engineer, and testing laboratory staff providing onsite services to Contractor.
   2. Conduct demonstration prior to using non-shrink grouting on project.
   3. Schedule presence of independent testing laboratory personnel as required, to conduct specified tests and to directly submit test reports.
   4. Notify Engineer at least 72 hours in advance of demonstration to allow Engineer to attend.
   5. During demonstration coordinate test specimen taking and specimen curing and breaking at an approved independent testing lab.
   6. Demonstration and Test Equipment: Provide as necessary including flow cone, 2-inch by 2-inch cube molds, mortar mixer, wheelbarrow, sample plates to be grouted, and curing rags and compound.
   7. Owner will pay for tests of grout cubes by independent test laboratory.
   8. Cure non-shrink grout in accordance with manufacturer's instructions.
   9. Establish location on project site and schedule for manufacturer's demonstration(s) of non-shrink grout as follows:
      a. Category I Grout:

1) mixing technique using a mortar mixer and grout(s) to be used.
2) Preparation and filling of a tie hole or precast joint to meet manufacturer's recommendations for placement and curing.
3) Placement into large areas to be grouted on the project, for example, guide blockouts.
4) Method for addition of aggregates into non-shrink grout when appropriate.
5) Method to properly flow grout under single-story column baseplate if required on the project.
6) Sampling and Testing: In accordance with Article, "Source Quality Control."

b. Category II, III Grouts:
1) Conduct flow cone test using /12 gallon of each type of grout to be placed, in accordance with Article, "Source Quality Control" for each type of grout to be placed as follows:
a) Place each sample into gallon can covered with glass plate to prevent evaporation and hold for up to 2 hours at 40 degrees F (4 degrees C) or higher as close to project temperature as possible.
b) Sample shall show no visible evidence of bleeding or settlement.
c) Control temperature of sample during curing, equivalent to lowest anticipated project temperature to demonstrate grout or heat in project area during placing and curing of grout.
d) Sampling and Compression testing: In accordance with Article, "Source Quality Control".

c. Category II and III Grout: Demonstrate capability of grouts to meet specifications for maintaining workability for minimum 1 hour after mixing with light agitation and mixed temperature of grout in range of 40 degrees F to 100 degrees F (4 degrees C to 38 degrees C).

PART 2 – PRODUCTS

2.01 NON-SHRINK GROUTS

A. Non-shrink grouts listed herein have been subjected to testing established by Engineer. Only non-shrink grouts meeting test requirements are specified herein.

B. If other than specified grouts are proposed, detailed testing and acceptance is required prior to opening of bids or prior to submittals. Contact Engineer for necessary test information and procedures.

C. Non-shrink Grout:
1. Provide non-shrink grout from the included approved list of manufacturers for applications in the grout category as specified in the following table:

Grout Use by Category

Application	Temperature Range (45 deg F to 90 deg F)
Filling tie holes	I
Blockouts for gate guides	II
Machine bases 25 hp or less	II
Bases for precast wall sections	II
Baseplates for columns	II
Through-bolt openings	II
Patching concrete walls	II
Machine bases 26 hp and up	III

D. Non-shrink Grout, Category I: non-metallic, nongas-liberating grouts as manufactured by:
   1. L&M Construction Chemicals, Inc., Omaha, NE, Crystex.
   2. Euclid Chemical Co., Cleveland, OH, EUCO NS Grout.
   3. Chemrex, Shakopee, MN, Set Grout.
   4. Sika, Lundhurst, SIKA 212.
   5. Or equal.

E. Non-shrink Grout, Category II:
   1. Fluid consistency in use (22- to 30-second flow through the Corps of Engineers' flow cone), except for formwork tie holes or through-bolt holes, of dry pack consistency.
   2. Fluid grouts for Category II shall meet CRD-C621-81 when tested at temperatures as specified and be able to pass through flow cone at maximum time limits shown for their category.
   3. Category II Grouts:
      a. Meet requirements for Category II, plus meet CRD-C621-81 at 40 degrees F to 100 degrees F.
      b. Fluid and able to pass through flow cone 1 hour after batching with light agitation
      c. Minimum strength of 2,500 psi at 1 day, 4,500 psi at 3 days, and 7,000 psi at 28 days when tested at 22-to 25-second flow.
      d. Manufacturer:
         1) Chemrex, Shakopee, MN, Sika, Lyndhurst, NJ, Sika 212

F. Non-shrink Grout Category III:
   1. Non-catalyst metallic grout free of gas-producing or gas-releasing agents, free of oxidizing catalysts, free of inorganic accelerators, and free of chlorides.
   2. Category III Grouts:
      a. Meet requirements of Category III, plus meet CRD-C621-81 at 40 degrees F to 100 degrees F.
      b. Fluid (22-second to 25-second flow) and able to flow under equipment to be grouted for at least 1 hour at any ambient temperature in this range.
      c. Only grout to be used in large area placements requiring metallic grout when placement takes longer than specified time limits for Category II.
      d. Minimum Compressive Cube Strength: 3,500 psi at 1 day, 6,000 psi at 7 days, and 8,000 psi at 28 days (2-inch cubes), when tested at 72 degrees F.

G. Grout for Clarifier Slabs:
   1. Purpose of grout topping is to provide a smooth, even surface for clarifier mechanism to operate on.
   2. Components: Screened sand, water, water reducing admixture, and minimum 752 pounds of cement per cubic yard.
   3. Consistency: As specified hereinafter for Screed Finish on Clarifier Slabs.

H. Grout For Horizontal Construction Joints in Walls: Flowable, consisting of sand, water, and minimum 12 sacks of cement per cubic yard.

I. Epoxy Grout:
   1. The epoxy grout or mortar for repairing wall edges, cut concrete surfaces, slab edges, doweling or anchoring in concrete and similar applications shall be design for adverse use in freeze/thaw environments. The manufacturer shall certify, in writing, its applicability in bonding to damp concrete surfaces and to the uses intended in this project.

2. The mixed two-component epoxy binder shall be gray in color. The cure temperature, pot life, and workability shall be compatible for intended use. The minimum density of the mortar shall be 130 pounds per cubic foot.
3. The aggregate shall be as recommended by the manufacturer.
4. The mortar mix design shall be Concresive 1470 mortar, Adhesive Engineering Co., San Carlos, CA; Sikadur 42 Grout Pak by Sika Corporation, Chicago, IL; or equal. The actual mix design shall be submitted by the manufacturer using the specified resin, and using the manufacturer's recommended sand mix.
5. The finished repair shall have a color which matches the surrounding concrete's color as best as possible.
6. Submit technical data (physical and chemical properties) available on the epoxy grout. Also, submit data (client name, location, and description of work) on at least two similar projects where the applicator has used the epoxy grout in the last 2 years.

2.02 CLARIFIER GROUT MIX DESIGN

A. General:
1. Design Strength: 5,000 psi at 28 days.
2. Minimum Cement Content: 752 pounds per cubic yard, regardless of strength.

B. Combined Aggregate Gradings:
1. Combine aggregate for grout in proportions that will provide a mixture within grading limits shown below, unless otherwise approved in writing by Engineer:

Sieve Sizes	**Percentage Passing Sand for Grout**
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10
No. 200	-

2.03 SOURCE QUALITY CONTROL FOR NON-SHRINK GROUT

A. Manufacturer's Demonstration and Grout Tests: Perform the following tests on non-shrink grout during manufacturer's demonstrations:
1. Category I Grout: Prepare minimum three 2-inch cube specimens, cure, and test in accordance with ASTM C 109-80 to verify strength.
2. Category II and III Grouts:
   a. Conduct flow cone test (Method CRD-C611-80) to meet flow at fluid consistency of 20 to 30 seconds for each type of grout.
   b. Cube Specimens:
      1) Prepare minimum three 2-inch cube specimens for each grout type at fluid consistency meeting flow cone requirements.
      2) Deliver these to an independent test laboratory for further curing and testing.
      3) Prepare specimens and test in accordance with CRD-C621-83 except as follows: Mix grout in accordance with manufacturer's instructions for 22- to 25-second flow.

4) Use Corps of Engineers' flow cone (CRD-C611-83) each time test cubes are made.

5) Fill molds in two layers, puddling each layer gently with gloved finger five times. Strike off excess grout. Wipe edges of mold clean with rag and cover with steel plate clamped to mold until time to test.

PART 3 – EXECUTION

3.01 PLACING GROUT

A. Place and cure non-shrink grout as directed by manufacturer.

B. Non-shrink Grout, Category I and II: For formwork tie holes or through-bolt holes, fill conical section with dry pack dense grout hammered in with steel tool and steel hammer. For through bolt holes coordinate the dry pack dense grout application with the vinyl plug as specified in Section 03100, Concrete Formwork, and the bonding agent specified in Section 03300, Concrete.

C. Location For Use of Non-shrink Grout Category III: As shown or as specified.

D. Horizontal Construction Joints in Reinforced Concrete Walls:

1. Use positive measuring device such as a bucket or other device that will contain only enough grout for depositing in one place in the wall to ensure that portion of the form does not receive too much grout. Limit grout placement to 2-inch maximum thickness.
2. Do not deposit grout from pump hoses or large concrete buckets unless inspection windows close to the joint are available to allow visual measurement of grout thickness and means for grout removal are available for removal of excess grout.

PART 4 – MEASUREMENT AND PAYMENT

4.01 LUMP SUM ITEMS

A. Payment for work in this section will be included as part of the lump sum bid.

- END OF SECTION -

4

DIVISION 4

MORTAR AND MASONRY

SECTION 04100

MORTAR AND MASONRY GROUT

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section includes mortar and masonry grout for masonry.

B. Related Sections and Divisions:
1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300 – Submittals.
3. Section 03300, Cast-in-Place Concrete Structures.

1.02 REFERENCES

A. Wisconsin Commercial Building Code

B. American Society for Testing and Materials (ASTM)
1. ASTM C144 Aggregate for Masonry Mortar.
2. ASTM C150 Portland Cement.
3. ASTM C207 Hydrated Lime for Masonry Purposes.
4. ASTM C404 Aggregate for Masonry Grout.
5. ASTM C476 Grout for Reinforced Masonry.
6. ASTM C979 Pigments for Integrally Colored Mortar.

C. American Concrete Institute (ACI)
1. ACI 531 Standard Building Code Requirements for Concrete Masonry, Structures.
2. ACI 531.1 Concrete Masonry Construction.

1.03 SUBMITTALS

A. Submit the following in accordance Section 01300, Submittals:
1. Manufacturer's certificate that products meet or exceed the specifications.
2. Design mix.
3. Test requirements.
4. Aggregate gradations.

1.04 DELIVERY, STORAGE AND HANDLING

A. All materials shall be stored to protect it from dampness and freezing.

PART 2 - PRODUCTS

2.01 MATERIALS FOR MASONRY MORTAR

A. Shall Conform to:
1. Portland Cement, Type 1 - ASTM C150.

2. Hydrated lime, Type "S" or "N" - ASTM C207.
3. Masonry cement - ASTM C91.
4. Aggregate for masonry mortar.
   a. Fine aggregate - ASTM C144.

B. Mixing water shall be from a domestic supply and be clean and free from injurious amounts of oil, acid, soluble salts and any other harmful substances.

C. Mortar Color Pigments
1. Shall be as recommended by manufacturer of the masonry units.
2. Shall be carbon (organic) or mineral oxide (inorganic) composition.

2.02 CONTROL JOINT MATERIAL

A. Shall be extruded from polyvinyl chloride conforming to:
1. ASTM D2287.
2. Durometer hardness of 90 when tested in accordance with ASTM D2240.

2.03 ANCHORS, TIES AND ACCESSORIES

A. Continuous joint reinforcement and wire ties.
1. Fabricate for cold drawn wire conforming to ASTM A82.
2. Minimum Wire Size:
   a. 9 gauge for single width or composite walls.
   b. 3/16 inch for cavity walls (provide moisture drip).
3. Cross wires on ladder and truss type reinforcement shall contact side rods every 16 inches.
4. Coating Requirement:
   a. Interior Walls: ASTM A641 (.10 oz. zinc/ft')
   b. Exterior Walls and Interior Walls Exposed to Moisture: ASTM A153, Class B2 (1.5 oz. zinc/ft2).

B. Wall Ties and Anchors
1. Shall be zinc coated (hot dipped) conforming to ASTM A153.
2. Minimum dimensions for ties and anchors shall conform to the following:
   a. Corrugated wall ties - 7/8-inch wide x 6 inches long x 22 gauge.
   b. Rigid steel anchors – 2 inches wide x ¼-inch thick x 24 inches long, ends turned up 2 inches and conforms to ASTM A36.
   c. Dovetail slots – 1-inch wide x 1 inch deep x 5/8-inch throat, 22 gauge.
   d. Dovetail anchors – 1-inch wide x 16 gauge turned up 1/4 inch at outer end. Length shall be in accordance to style.
   e. Channel slot and anchor-equivalent to 3/16-8inch diameter anchor.
   f. 3/8-inch exp. metal as detailed on the drawings for intersecting walls non-load bearing with load bearing.

C. Base Flashing:
1. 20 mil vinyl unless otherwise indicated.

D. Reglets:
1. 20 gauge galvanized metal unless otherwise indicated.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Mortar shall conform to:
1. Mortar types "M", "S" and "N" - ASTM C270.
2. Mortar types "PM" and "PL" - ASTM C476.
3. Approved design mix.
4. Admixtures shall not be used without written approval of Engineer/Architect.

B. Mortar shall meet the requirements of the following table:

Compressive Strength of 2 Inch Cubes, PSI

Mortar Type	*At 7 days	At 28 days
"M"	--	2,500
"S"	--	1,800
"N"	--	750
"PM"	1,600	2,500
"PL"	1,600	2,500

*Mortar which fails the 7 day requirement but meets the 28 day requirement shall be acceptable.

C. Mortar shall be machine mixed with a conventional paddle blade mortar mixer.
1. Ingredients shall be placed in the mixer in the following order:
   a. Water and sand first.
   b. Cement second.
   c. When lime is used, add last.
2. Batches shall be mixed a minimum period of three (3) minutes.
3. Mix mortar as wet as possible while retaining sufficient stiffness to support the masonry units.

D. Mortar shall be retempered as frequently as needed and placed in final position within 2 ½ hours of initial mixing.

E. Mortar types shall be utilized as follows:
1. Type "M" - For below grade masonry, reinforced masonry and grouted masonry.
2. Type "S" - For above grade exterior bearing and non-bearing walls and interior bearing walls.
3. Type "N" - Restricted to use in interior non-bearing walls.
4. Type "PM" & "PL" - Used the same as Type "M", but when an early high strength is desirable.

F. Pigment Utilization
1. Pigments shall be mixed or interground with the dry cement.
2. Pigments shall be limited in use to the following quantities: a. Inorganic pigment: 10 percent by weight of the cement. b. Organic pigment: 3 percent by weight of the cement.
3. Mortar with colored pigments shall not be retempered.
4. Mortar to be integrally colored with block.

3.02 MASONRY GROUT

A. General Requirements
   1. Grout shall be Class A-3 concrete as specified in Section 03300.

B Grout Utilization
   1. Grout shall be used in spaces 4 inches x 4 inches or greater, including bond beams.
      a. Whenever practicable, the 3/8 inch aggregate may be increased to a maximum of ¾ inches.
   2. Grout shall be used in all bond beam and where indicated on plans.
   3. Placing of grout shall conform to ACI 531.1.

3.03 PREPARATION FOR MASONRY CONSTRUCTION

A. Lay out masonry construction in accordance with project drawings.

B. The following shall be free of laitance or any substance that will prevent bonding of the mortar.
   1. Foundation for masonry units.
   2. Reinforcement and masonry accessories.
   3. Projecting dowels.

C. Do not proceed with masonry construction when the following foundation tolerance is not met:
   1. Horizontal and vertical alignment - ± ¼ inch in 10 feet.
   2. Maximum variation shall not exceed 1/2 inch.

D. Use masonry saws to cut and fit exposed units.

E. Wall Pattern
   1. Unless indicated otherwise pattern shall be a running bond.

3.04 MASONRY UNIT GENERAL INSTALLATION

A. Preparation and Tolerance Requirements
   1. The use of cracked, broken or chipped masonry units shall not be permitted.

   2. Lay units plumb, true to line and with courses spaced within allowable tolerances for walls.
      a. Wall thickness, multiple widths - ± ¼ inch.
      b. Vertical alignment - ± ¼ inch in 10 feet.
         ± ½ inch maximum per floor
         ± 1 inch maximum per total height
      c. Horizontal alignment - ± ¼ inch in 10 feet.

B. Placing Masonry Units.
   1. Place all units in a full bed or mortar.
   2. Bed joints for solid units shall not be furrowed.
   3. Hollow units shall have a head joint equal to the masonry unit face shell thickness.
   4. Solid units shall be placed with a full head joint.
   5. Standard joints shall be 3/8 inch thick.

a. Maximum thickness variation - ± 1/8 inch.

6. Adjust units to final position while mortar is soft and plastic.
7. If units are displaced after mortar has stiffened, remove, clean joints and units of mortar and relay with fresh mortar.
8. Adjust shelf angles to keep work level at proper elevation.
9. When joining fresh masonry to set or partially set masonry:
   a. Remove loose brick or mortar.
   b. Clean and lightly wet exposed surface of set masonry prior to laying fresh masonry.
10. Align vertical cells to be filled with grout.
11. Remove mortar protrusions extending more than ½ inch into cells or cavities to be grouted.
12. Fill in all spaces around metal door frames and other built-in items with mortar as each course is placed.
13. All collar joints shall be filled solid with masonry grout or by back packing with mortar.
14. Mortar placed on wall shall be limited to that which can be covered before the surface begins to dry.
15. Do not pound comers or jambs to fit stretcher units after setting in place.
16. Tool all joints in exposed surfaces when thumb-print hard.
    a. Concave tooling shall be standard unless shown otherwise on plans.
17. Strike joints flush when:
    a. Covered by another finish.
    b. Below grade on exterior walls.
18. Temporarily brace or shore masonry as required during construction.

C. Control Joints
   1. Provide where shown on plans.
   2. Shall be weather tight.
   3. Extend through bond beams.
   4. Rake to a depth of ¾ inches and caulk.

D. Bond wall comers and intersections by one of the following methods.
   1. Load-bearing walls to load-bearing walls:
      a. Provide rigid steel anchors spaced vertically a maximum of 24 inches.
      b. Lap 50 percent of the masonry units.
   2. Non-load-bearing walls to non-load-bearing walls.
      a. Provide corrugated wall ties spaced vertically a maximum of 16 inches.
      b. Lap 50 percent of the masonry units.
   3. Load-bearing walls to non-load-bearing walls.
      a. Provide corrugated wall ties spaced vertically a maximum of 16 inches.
   4. Anchors and ties shall be embedded equally in each wall.

E. Anchoring
   1. Anchor all masonry to structural framework where masonry is dependent upon framework for lateral support.
   2. Anchors and ties shall be embedded a minimum of 3 inches and have a maximum spacing as follows:
      a. Horizontal - 24 inches.
      b. Vertical - 16 inches.

F. Joint Reinforcement
1. Provide continuous joint reinforcing starting at the first course above flashing and every other course above.
2. Embed reinforcement with a minimum cover of 5/8 inch mortar cover in all exterior walls and 1/2 inch in other locations.
3. Do not extend through control joints.
4. Overlap at comer and intersections when walls are laid simultaneously.
5. Overlap splices a minimum of 12 inches.

G. Flashing:
1. Provide base flashing in exterior walls:
   a. Above grade at first floor elevation.
   b. Above bond beams at intermediate wall elevations.
   c. Above lintels in exterior walls.
2. Clean masonry of projections, which may puncture or damage flashing.
3. Place through-wall flashing on bed of mortar.
4. Cover flashing with mortar.
5. Trim exterior edge of flashings flush with masonry surface.
6. Through wall flashings above bond beams or lintels shall be installed high enough to allow water to discharge through weep holes.

H. Reglets
1. Install as detailed on plans.
   a. Weepholes
   b. Provide weepholes in head joints in first course immediately above flashing.
2. Leave head joint free and clean of mortar.
3. Maximum spacing: 32 inches.
4. Keep weepholes and area above flashing free of mortar droppings.

I. Sealant Joints
1. Rake sealant joints around outside perimeters of exterior doors, window frames, and wall openings:
   a. Uniform depth: ¾ inch.
   b. Uniform width: 1/4 inch unless otherwise indicated.

J. Bond Beam
1. Provide a continuous bond beam at the top course for every single story building and at intermediate floor bearing surface elevation and top course for every multi-story building.
2. Unless shown otherwise on plans, provide two - #5 reinforcement bars in bond beams.
   a. Reinforcement bars shall be Grade 40 conforming to ASTM A615.
3. Fill the bond beam with coarse masonry grout.
4. Provide greased smooth dowels at expansion, contraction, and control joints.

K. Lintels
1. Fill block cores of Z courses below lintel bearing with Class A3 concrete or provide solid masonry units.
2. Install lintels (provided by structural steel contractor) in locations as shown on plans.
3. Lintels shall be installed level, plumb, and evenly distribute loads on to masonry below.
4. Lintel heights shall be as noted in door schedule for masonry openings.

L. Pilasters
1. Provide pilasters as shown on the plans.
2. Pilasters shall be constructed of interlocking masonry units filled with grout or solid pilaster units. Hollow pilaster units are not acceptable.

M. Penetrations
1. Cut or grind a smooth perimeter around penetrations through split-face or textured masonry surfaces to accommodate a tight fit for grills, collars and frames.

3.05 COLD WEATHER PROTECTION

A. Preparation
1. No frozen material or material containing ice shall be used.
2. Masonry bed shall be free of ice and snow.
3. Do not heat any materials above 140 degrees F.

B. The following shall be the criteria for cold weather installations.
1. Below 40 degrees F.
   a. Heat mixing water to provide a mortar temperature between 50 degrees F and 120 degrees F until mortar is placed.
   b. Cover walls to prevent wetting.
2. Below 32 degrees F.
   a. Heat mixing water and sand to produce a mortar temperature between 50 degrees F and 120 degrees F until mortar is placed.
   b. Cover walls to prevent wetting and freezing while curing.
   c. Masonry shall be cured in a temperature above 40 degrees F for 24 hours.
   d. Provide windbreaks when wind velocities over 15 M.P.H. prevail.
3. Below 20 degrees F.
   a. Heat mixing water and sand to produce a mortar temperature between 50 degrees F and 120 degrees F until mortar is placed.
   b. Masonry units must be dry and warmed to 50 degrees F.
   c. Provide a heated enclosure to maintain a minimum of 40 degrees F during construction and for 24 hours after laying.

3.06 HOT WEATHER REQUIREMENTS

A. Conform to the following:
1. Store all materials in a shaded and protected area.
2. Lightly wet mortar bedding areas.
3. Apply a light mist spray several times during the first 24 hours of curing.

3.07 LOADING COMPLETED MASONRY

A. Do not apply uniform floor or roof loading for at least 24 hours after completing masonry columns or walls.

B. Do not apply concentrated loads for at least three days after completing masonry columns or walls.

3.08 POINTING AND CLEANING

A. Cut out any defective joints and holes in exposed masonry and repoint with mortar.

B. Dry brush masonry surface after mortar has set at end of each day's work and after final pointing.

C. Clean exposed masonry with stiff brush and clear water.

D. If cleaning with water does not produce satisfactory results; apply a cleaning agent to sample wall area of 20 sq. ft. in a location acceptable to the Engineer/Architect.
   1. Do not proceed with cleaning until sample area is acceptable to Engineer/Architect.
   2. Follow manufacturer's recommendations.
   3. Thoroughly wet surface of masonry before using cleaning agent.
   4. Scrub with acceptable cleaning agent. Muriatic acid solutions shall not exceed 5% strength.
   5. Immediately rinse with clear water.
   6. Work small sections at a time.
   7. Work from top to bottom.
   8. Protect sash, metal lintels and other materials which may corrode when masonry is cleaned with acid solution.
   9. Remove efflorescence in accordance with brick manufacturer's recommendations.

E. Thirty days after completion of masonry walls, Contractor shall clean any efflorescence by dry brushing or light sandblasting.

- END OF SECTION -

SECTION 04200

UNIT MASONRY

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section includes material and performance requirements of masonry units.

B. Related sections and divisions
   1. Applicable provision of the General Conditions shall govern the work in this section.
   2. Section 01300, Submittals
   3. Section 04100, Mortar and Masonry Grout.

1.02 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):
   1. ASTM C55 Spec. for Concrete Building Brick.
   2. ASTM C67 Sampling and Testing Brick and Structural Clay Tile.
   3. ASTM C90 Spec. for Load-Bearing Concrete Masonry Units.
   4. ASTM C216 Spec. for Facing Brick (Solid Masonry Units Made from Clay or Shale).

1.03 QUALITY ASSURANCE

A. All masonry shall be available to Owner's representative for inspection.

B. Masonry units shall be free from:
   1. Cracks and laminations.
   2. Admixtures or coatings which interfere with installation or impair strength of the structure.

C. The following shall conform to the governing building code.
   1. Manufacturer's identification markings.
   2. Masonry unit fire ratings.

1.04 SUBMITTALS

A. Contractor shall provide certification that masonry units conform to governing building codes.

B. Provide sample masonry units to construct sample panels as defined in Section: Mortar, Masonry Grout and Methods of Masonry Construction.

PART 2 - PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Weight Classification (Oven-Dry Weight of Concrete Lb/Ft3).
   1. Normal weight: 125 or more.

2. Medium weight: 105 to 125.
3. Light weight: Less than 105.

B. Load-Bearing Units:
1. Conform to ASTM C90, Grade N. Type 11.
2. Size - Nominal 8 inches x 16 inches x width shown on plan.

C. Decorative Units
1. County Concrete Corporation full-face split, or equal, color selected by Owner.

D. Insulation
1. All exterior concrete block shall be insulated foam after installation.
a) Foam insulation shall be core fill 500 or equal.
8" Block/132 lb density, R value 4.4.
12" Block/132 lb density, R value 7.1.

E. Glass Block
1. Nominal 8-inches x 8-inches x 4-inches thick, clearview, partially evacuated units made of clear, odorless glass.
2. Pattern type shall be Vue.
3. Pittsburgh Corning, PC Glass Block, or equal.

F. Brick
1. Conform to ASTM C55, Grade N, Type II.
2. Size - Standard 2¼ inches x 5-5/8 inches x 7-5/8 inches.
3. Owner to determine brick color.

G. Curing
1. Masonry units shall cure for a minimum of 28 days prior to use.

2.02 MASONRY FACING UNITS

A. Solid Facing Brick
1. Conform to ASTM C216 and C-67, Grade SW, Type FBS.
2. Size: Standard 2¼-inch x 3-3/8 inches x 7-5/8 inches.
3. Provide brick uniform in texture, color and size to those selected on sample panel.

PART 3 - EXECUTION

3.01 GENERAL

A. Unless indicated otherwise on plans, provide standard weight units.

B. Provide load-bearing units for all construction.

C. Use bullnose units at all interior door and window jambs & interior outside corners.

C. Refer to applicable Section for installation.

- END OF SECTION -

5

DIVISION 5

METALS

SECTION 05500

METAL FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section included providing miscellaneous metal work including HVAC and electrical supports as shown on drawings, as specified herein, and as needed for complete installation.

B. Related Sections and Divisions:
1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Section 05520, Handrails and Railings
4. Section 05531, Aluminum Gratings
5. Section 09800, Painting and Special Coatings
6. Division 15 regarding HVAC equipment.

1.02 REFERENCE STANDARDS

A. American Society for Testing and Material (ASTM):

1.	ASTM A36	Spec. for Structural Steel.
2.	ASTM A48	Gray Iron Castings.
3.	ASTM A53	Spec. for Welded and Seamless Steel Pipe.
4.	ASTM A123	Spec. for Zinc (Hot Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strip.
5.	ASTM A153	Spec. for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
6.	ASTM A307	Spec. for Carbon Steel Externally and Internally Threaded Standard Fasteners.
7.	ASTM A325	Spec. for High-Strength Bolts for Structural Steel Joints.
8.	ASTM A500	Spec. for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
9.	ASTM A615	Spec. for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
10.	ASTM D2146	Spec. for Propylene Plastic Molding and Extrusion Materials.

B. American Welding Society (AWS):

1.	AWS D1.1	Structural Welding Code - Steel.

1.03 DELIVERY, STORAGE AND HANDLING

A. Tag miscellaneous metals including anchor bolts, concrete anchors, sleeves and bases for ease of identification at site.

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300, Submittals including:
1. Material sizes, connections, anchors and painting.

2. Installation procedures.

PART 2 - PRODUCTS

2.01 MATERIAL

A. Steel Plates and Shapes shall conform to ASTM A36.

B. Steel Pipe shall conform to ASTM A53, Grade B

C. Structural Tubing shall conform to ASTM A500, Grade B

D. Aluminum Structural Shapes and Plates shall conform to Alloy 6061-T6

E. Interior Stainless shall conform to Type 304 or 316
Exterior or Submerged stainless steel shall be Type 316

F. Connection Bolts:
1. Structural Steel: ASTM A325.
2. Wood: 316 Stainless Steel.
3. Aluminum: 316 Stainless Steel.

2.02 FABRICATION & FINISH

A. Connections
1. Provide clips, lugs, brackets, straps, plates, bolts, nuts, washers, and similar items required for fabrication and erection.
2. Weld shop connections.
3. Bolt or weld field connections.

B. Workmanship
1. Grind exposed welds to 1/8 inch minimum radius.
2. Grind burrs, jagged edges, and surface defects smooth.
3. Use bolt length such that bolt does not project more than ¼ inch beyond face of nut.

C. Galvanizing
1. Galvanize after fabrication, in accordance with ASTM A123 or A153, as applicable.
2. Ship and handle to avoid damaging zinc coating.
3. Repair field damaged galvanizing as specified in 3.08 of this specification.

D. Painting
1. Painting shall be as specified in Section 09800, Painting and Special Coatings.

2.03 MANHOLE STEPS

A. Steps shall be steel reinforced plastic.

B. Plastic shall be a polypropylene conforming to ASTM D2146.

C. Reinforcement shall be a deformed ½ inch diameter bar (minimum) conforming to ASTM A615, Grade 60.

D. Minimum design live load shall be a single concentrated load of 300 lbs. when in place.

E. Minimal dimensions:
   1. 12 inches wide.
   2. Project 5 to 7 inches from wall.
   3. Space 16 inches on center.

2.04 ANCHOR BOLTS

A. Anchor bolts for equipment and machinery, where permanently anchored into concrete, shall be Type 316 stainless steel. The diameter, length, and any bend dimensions shall be as required by the equipment or machinery manufacturer. Unless otherwise required, use 3/4-inch minimum diameter and other geometry shown on the drawings. Furnish a minimum of two nuts and a washer of the same material for each bolt.

2.05 STAINLESS STEEL FASTENERS LUBRICANT (ANTI-SEIZING)

A. Where stainless steel nuts and machined bolts, anchor bolts, concrete anchors, and all other threaded fasteners are used, Contractor shall apply an anti-seizing lubricant to the threads prior to making up the connections. The lubricant shall contain substantial amounts of molybdenum disulfide, graphite, mica, talic, or copper.

2.06 ANCHORING SYSTEMS FOR CONCRETE

A. Wedge Anchors:
   1. Wedge anchors shall be 100 percent 316 stainless steel and shall not be used below a point 1 foot 6 inches above the peak (maximum water surface in any water-holding structure. See adhesive anchors specified elsewhere in this Specification.
   2. Wedge anchors shall be 316 stainless steel, manufactured by ITT Phillips Drill Division, Michigan City, IN; Hilti Kwik-Bolt, stud type, manufactured by Hilti, Inc., Stamford, CT; Weg-It, stainless steel bolts, completely assembled, manufactured by Wej-It Corporation, Broomfield, CO; Parabolt Concrete Anchors, manufactured by Molly Division of Emhart Corp., Templ,e PA; or equal. Furnish sizes shown on Drawings. Provide ICBO (International Conference of Building Officials) or other similar building code organization recommendations regarding safe allowable design loads.

B. Expansion Anchors:
   1. Expansion anchors shall be 316 stainless steel. In the wet or damp areas, use wedge anchors as specified above or epoxy anchors in submerged conditions as hereinafter specified; 316 stainless steel expansion anchors may be used as defined for stainless wedge anchors.
   2. Self-drilling anchors, snap-off type or flush type. Provide anchors for use with stainless steel bolts. Non-drilling anchors shall be flush type for use with a bolt or stud type with projecting threaded stud. Provide ICBO or other similar code organizations' recommendations regarding safe allowable design loads. ITT Phillips Drill Division, Michigan City, IN; Hilti HDI Drop-In anchors, Hilti, Inc., Stamford, CT; or equal.

C. Epoxy Anchors:

1. Provide for anchoring metal components at or below a point 1 foot 6 inches above maximum water surface elevation in water-holding structures, or buried in earth conditions.
2. Anchor Rod: 316 stainless steel threaded rod free of grease, oil, or other deleterious material with a 45-degree chisel point.
3. Epoxy Adhesive:
   a. Meet ASTM C 881, Type 1, Grade 3, Class A, B, or C.
   b. Two-component, 100 percent solids, nonsag, paste, insensitive to moisture, designed to be used in adverse freeze/thaw environments, gray in color.
4. Mixed Epoxy Adhesive:
   a. Nonsag paste consistency with ability to remain in a 1-inch diameter overhead drilled hole without runout, holding the following properties:
      1) Slant Shear Strength, ASTM C 881/882, No Failure In Bond Line, Dry/Moist Conditions: 5,000 psi.
      2) Compressive Strength, ASTM D 695: 14,000 psi minimum.
      3) Tensile Strength, ASTM D 695: 4,5000 psi.
      4) Heat Deflection Temperature, ASTM D 648: 136 degrees F, minimum.
5. Epoxy Adhesive Packaging:
   a. Disposable, self-contained cartridge system capable of dispensing both epoxy components in the proper mixing ratio, and fit into a manually or pneumatically operated caulking gun.
   b. Dispense components through a mixing nozzle that thoroughly mixes components and places epoxy at base of pre-drilled hole.
   c. Mixing Nozzles: Disposable, manufactured in several sizes to accommodate sizes anchor rods.
   d. Cartridge Markings: Include manufacturer's name, batch number, mix ratio by volume, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions.
6. Storage of Epoxy Adhesive:
   a. Store epoxy cartridges on pallets or shelving in a covered storage area.
   b. Control temperature above 60 degrees F and dispose of cartridges if shelf life has expired.
   c. If stored at temperatures below 60 degrees F, test adhesive prior to use to determine if adhesive meets specified requirements.
7. Manufacturers:
   a. Adhesives Technology Corp., 21850 88th Place South, Kent, WA 98031; Anchor-It Fastening Systems, HS 200 Epoxy Resin;
   b. Or Equal.

2.07 ANCHOR SYSTEMS FOR MASONRY WALLS

A. Stainless steel sleeve anchor, Hilti HLC, or equal.

B. Wedge anchors may be used in solid grouted masonry walls.

C. Drive anchors are not acceptable.

2.08 ANCHOR SYSTEMS FOR GYPSUM BOARD WALLS

A. Use Toggler bolt, Hilti, or equal.

2.09 METAL WEIR PLATES, BAFFLES, AND SUPPORTS

A. Shall be 304 stainless steel, unless indicated otherwise, or furnished with equipment.

2.10 ACCESS HATCHES

A. Frame
   1. ¼ inch min. channel aluminum with anchor flange around perimeter and neoprene cushion.
   2. Bituminous coating on outside of frame.
   3. Provide 1-1/2 inch drain coupling in the corner of the channel frame locate as shown on the plans. Provide all SCH. 40 PVC drainage piping as shown on the drawings.

B. Doors
   1. ¼-inch minimum aluminum diamond plate, reinforced as required to support a 300 psf live load.
   2. Counterbalanced for ease of operation.
   3. Automatically lock in the open position.
   4. Snap lock with removable handle.
   5. Double leaf doors shall be fitted with 316 stainless steel chains on each end to guard opening when doors are open.
   6. Access doors for valve vaults and meter vaults shall include ladder extension, Halliday L1E, Bilco "Ladder Up", or equal.

C. Hardware
   1. Stainless Steel.

D. Guarantee
   1. Manufacturer shall guarantee door to be free of defects in material and workmanship for period of five years.

E. Acceptable Manufacturers
   1. Halliday, Bilco, or equal.

2.11 CAST IRON CASTINGS

A. Conform to the following:
   1. ASTM A48, Class 30.
   2. Free of blowholes, shrinkage, distortion, and other defects.
   3. Provide where shown on plans or schedule.

B. Acceptable manufacturers.
   1. Neenah Foundry Company.
   2. East Jordan Iron Works, Inc.
   3. Or equal.

2.12 ALUMINUM CASTINGS

A. Conform to the following:
   1. Free of blow holes.
   2. Free of blowholes, shrinkage, distortion, and other defects.
   3. Provide where shown on plans or schedule.

B. Acceptable manufacturers.
   1. Neenah Foundry Company.
   2. East Jordan Iron Works, Inc.
   3. Or equal.

2.13 ABRASIVE NOSINGS FOR CONCRETE STAIRS

A. Except as otherwise indicated, provide flush type abrasive nosings on all stairs. Nosing shall consist of a homogeneous epoxy abrasive, with minimum 50 percent aluminum base. The epoxy abrasive shall extend over and form the curved front edge of the nosing to a depth of at least 1/2 inch. The base of the nosing shall be extruded aluminum alloy, 6063-T5, heat-treated. All aluminum surfaces in contact with concrete or dissimilar metals shall be coated as specified in Section 09800, Painting.

B. Anchoring system shall be double-set anchors consisting of two rows of integrally extruded anchors.

C. Nosings shall be protected with a factory applied heavy-duty polyethylene cloth moisture-proof tape.

D. Size shall be 3-inch wide by 3/8-inch thick by length which is 4 inches less than width of stair tread for cast-in-lace concrete stairs and 3/8 inches less than width of stair tread for concrete filled pan stairs.

E. Color shall be as indicated in the Finish Schedule.

F. Supply Spectra Type WP-3J and WP-3C as manufactured by Wooster Products, Inc.; Amcolun Type BF3 and DSA3 as manufactured by American Abrasive Metals Company; or equal. Use first type listed for concrete filled pan treads and second type for cast-in-place concrete treads.

2.14 CHECKERED PLAT & FRAMES

A. Aluminum: Alloy 6061-T6, tread plate, thickness as indicated, 1/4-inch minimum, fasten all accessories by welding or stainless steel bolts or screws.

2.15 MISCELLANEOUS ITEMS

A. Fabricate and finish miscellaneous steel framing, supports and items, including but not limited to the following:
   1. Lintels—hot dip galvanized.
   2. Equipment bases--painted.
   3. Guard Posts—hot dip galvanized.
   4. Bar Screens—stainless steel.

B. Use plates, shapes, bars and tubing of the material, size, shape and arrangement indicated on the plans.

2.16 ALUMINUM STAIRS

A. Provide as detailed on plans.

B. Include components such as framing, platforms, hangers, columns, struts, clips, brackets, bearing plates and platforms.

C. Close ends of stringers with plates, continuously welded and ground smooth.

D. Grating treads and landings shall conform to Section 05531, Aluminum Gratings.

E. Provide railings in accordance with Section 05520, Handrails and Railings.

2.17 LADDERS

A. All ladders utilized on the project shall be of aluminum construction, unless specifically indicated otherwise on the Drawings.

1. Aluminum: Fabricate the aluminum ladders with rails and rod rungs as shown. Punch inside face of rails, pass rungs through the rails, and weld as shown on the drawing. Fabricate brackets for fastening the ladder to the wall and weld to the ladder. Ladder shall conform to the applicable requirements of OSHA, the State Basic Safety Code, or other regulatory authority. Hot-dip galvanize steel ladder after fabrication.
2. Ladder Safety Post: All ladders installed beneath sidewalk doors, roof hatches, skylights, or other floor or roof openings shall be equipped with a telescoping tubular safety post, spring balanced and automatically locking in the raised position, with release level for unlocking. Post shall be same material as ladder and spring mechanism shall be corrosion-resistant steel alloy. Post shall be Halliday L1E, Bilco "Ladder Up" safety post, or equal.

PART 3 - EXECUTION

3.01 GENERAL

A. Workmanship and finish of all metalwork specified under this section shall be the highest grade and equal to the best practice of modern shop[s for the respective work. Exposed surfaces shall have smooth finish and sharp, well-defined lines. Provide all necessary rabbets, lugs, and brackets so that the work can be assembled in a neat, substantial manner. Conceal fastenings where practical. Drill metalwork and countersink holes as required for attaching hardware or other materials. Fabricate materials as specified. Weld connections, except where bolting is directed. Items requiring special fabrication methods are mentioned herein. Fabrication of all other items shall be of equal quality. Methods of fabrication not otherwise specified or shown shall be adequate for the stresses and as directed by the Engineer.

B. Grind all exposed edges of welds smooth on walkways, guardrails, handrails, stairways, channel door frames, steel column bases, and where indicated on the Drawings. All sharp edges shall be

rounded to a 1/8-inch minimum radius; all burrs, jagged edges, and surface defects shall be ground smooth.

C. Welds and adjacent areas shall be prepared such that there is 1) no undercutting or reverse ridges on the weld bead 2) no weld spatter on or adjacent to the weld or any other area to be painted, and 3) no sharp peaks or ridges along the weld bead. All embedded pieces of electrode or wire shall be ground flush with the adjacent surface of the weld bead.

1. Aluminum: Fabricate aluminum as shown, and in accordance with the Aluminum Association Standards and the manufacturer's recommendations as approved. Grind smooth sheared edges exposed in the finished work.

3.02 WELDING

A. The technique of welding employed, appearance, quality of welds made, and the methods of correcting defective work shall conform to codes for Arc and Gas Welding in Building Construction of the AWS and AISC. Surfaces to be welded shall be free from loose scale, rust, grease, paint, and other foreign material, except that mill scale, which will withstand vigorous wire brushing may remain. A light film of linseed oil may likewise be disregarded. No welding shall be done when the temperature of the base metal is lower than zero degrees F. Finished members shall be true to line and free from twists.

B. All welding operators shall be qualified in accordance with the requirements of current AWS Standard Qualification Procedure D1.1, Chapter 5, and welders of structural and reinforcing steel shall be certified for all positions of welding in accordance with such procedure. Qualification test shall be run by a recognized testing laboratory at the Contractor's expense. Previous recent qualification by the State of Wisconsin will be acceptable.

C. All welding operators shall be subject to examination for requalifications using the equipment, materials, and electrodes employed in the execution of the Contract work. Such requalification, if ordered by the Engineer, shall be done at the expense of the Contractor.

1. Aluminum: Aluminum shall be welded with Gas Metal Arc (MIG) or Gas Tungsten Arc (TIG) processes in accordance with the manufacturer's recommendations as approved, and in accordance with the recommendations of the American Welding Society contained in the Welding Handbook, as last revised. Grind smooth all exposed aluminum welds.

3.03 INSTALLATION OF FABRICATED METALWORK

A. Install in accordance with the shop drawings, the Drawings, and these Specifications. Perform field welding and erection work by skilled mechanics. Install fabricated metalwork plumb or level as applicable. The completed installations shall, in all cases, be rigid, substantial, and neat in appearance. Erect structural steel in accordance with the applicable portions of AISC Code of Standard Practice, except as modified. Install commercially manufactured products in accordance with manufacturer's recommendations as approved.

B. Aluminum: Erection of aluminum shall be in accordance with the Aluminum Association. Mill markings shall not be removed from concealed surfaces. Exposed surfaces not otherwise coated shall have the inked or painted identification marks removed after the material has been inspected an approved by the Engineer.

3.04 ANCHOR BOLTS

A. All anchor bolts shall be accurately located and held in a place with templates at the time the concrete is poured.

3.05 CONCRETE ANCHORS

A. Installation shall not begin until the concrete or masonry receiving the anchors has attained its design strength. An anchor shall not be installed closer than six times it diameter to either an edge of the concrete or masonry, or to another anchor, unless specifically detailed otherwise on the Drawings. Install in strict conformance with manufacturer's written instructions. Use manufacturer's recommended drills and equipment.

B. Epoxy Anchors: Do not install when temperature of concrete is below 35 degrees F or above 110 degrees F.

3.06 ABRASIVE NOSINGS

A. Provide abrasive nosings on all concrete steps not being supplied or coated with alternate type of nosing or nonskid material.

3.07 ACCESS COVERS

A. Covers shall be accurately and substantially positioned prior to placing concrete, such that the covers are flush with the floor surface. The covers shall be protected from damage resulting from concrete placement. Exposed surfaces shall be thoroughly cleaned of all concrete spillage such that a clean, uniform appearance is achieved.

3.08 GALVANIZING AND REPAIR

A. Galvanizing of steelplates, shapes, bars (and products fabricated from these items, and strip 1/8-inch thick or thicker, shall conform to ASTM A 123. Pipe, welded or seamless steel, shall conform to ASTM A 120. Material thinner than 1/8 inch shall either be galvanized before fabrication in conformance with the requirements of ASTM A 525, Coating Designation G 210; after fabrication, in conformance with the requirements of ASTM A 123, except that the weight of zinc coating shall average not less than 1.2 ounces per square foot of actual surface area with no individual specimen having a weight of less than 1.0 ounce. Unless otherwise provided, galvanizing shall be done before or after fabrication, for material which is thinner than 1/8 inch, at the option of the Contractor. Galvanizing will not be required for stainless steel, monel metal, and similar corrosion-resistant parts.

B. All welded areas shall be thoroughly cleaned prior to galvanizing to remove all slag or other material that would interfere with the adherence of the zinc. When it is necessary to straighten any sections after galvanizing, such work shall be performed without damage to the zinc coating.

C. Galvanizing of chain link fence fabric, when specified or shown on the Drawings, shall conform to ASTM A 117.

D. In like manner, galvanizing of iron and steel hardware, and nuts and bolts, shall conform to ASTM A 153. Galvanizing shall be performed after fabrication. Galvanizing of tapped holes will not be required.

E. Fabrication shall include all operations such as shearing, cutting, punching, forming, drilling, milling, bending, welding, and riveting.

F. Components of bolted assemblies shall be galvanized separately before assembly.

G. The minimum pitch diameter of the threaded portion of all bolts, anchor bars, or studs shall conform to ANSI B1.1, having Class 2A tolerance before galvanizing. After galvanizing, the pitch diameter of the nuts or other internally threaded parts may be tapped over ANSI B1.1, Class 2B tolerance, by the following maximum amounts:

3/8 inch through 9/16 inch	0.016-inch oversize
5/8 inch through 1 inch	0.023-inch oversize
1-1/8 inch and larger	0.033-inch oversize

H. Galvanized surfaces which are specifically to be painted shall be prepared in the field approximately 48 to 72 hours before painting in accordance with System No. 10, Galvanized Metal Conditioning in Section 09900 Painting.

I. Except for inlet grates not otherwise required to be welded, all edges of tightly contacting surfaces, where galvanized is required, shall be completely sealed by welding before galvanizing.

J. Galvanized surfaces that are abraded or damaged at any time after the application of the zinc coating shall be repaired by solvent cleaning the damaged area (Steel Structures Painting Council SP 1) and hand or power tool (Steel Structures Painting Council SP 2 or SP 3) the damaged areas, removing all loose and cracked coating; after which the cleaned areas shall be painted with one of the following coatings:

1. One coat of Inorganic Zinc Silicate (MIL-P-23236, Class 3).
2. Two coats of Galvanizing Repair Paint (MIL-P-21035).
3. Two coats of Zinc Dust Paint (MIL-E-15145, Formula 102).

K. Paint shall be applied to a cleaned surface. Abrasive blasting is required for inorganic zinc silicate.

3.09 ELECTROLYTIC PROTECTION

A. Where aluminum is in contact with dissimilar metals, or to be embedded in masonry or concrete, protect surfaces in accordance with Section 09800, Painting. Allow paint to dry before installation of the material. Protect painted surfaces during installation; should coating become marred, prepare and touch up surface per paint manufacturer's instructions.

3.10 PAINTING

A. Thoroughly clean all ferrous metal items and give a shop coat of metal primer. Preparation of surfaces and application of primer shall be in accordance with the paint manufacturer's printed directions and recommendations as approved; and in accordance with Section 09800 Painting, utilizing the appropriate painting system.

3.11 PREPARATION FOR SHIPMENT

A. Insofar as is practical, the items provided hereunder shall be factory assembled. The parts and assemblies that are necessity shipped unassembled, shall be packaged and clearly tagged in a manner that will protect the materials from damage, and facilitate the identification and final assembly in the field.

- END OF SECTION -

6

DIVISION 6

WOOD AND PLASTICS

SECTION 06100

STRUCTURAL & ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section includes providing all materials and labor necessary to construct wood framing and sheathing as required on the plans and this section.

B. Related Sections and Divisions: Applicable provisions of the General Conditions shall govern the work in this section.

1.02 REFERENCE STANDARDS

A. National Forest Products Association (NFPA):
   1. National Design Specification for Wood Construction

B. American Plywood Association (APA):
   1. APA Group 2

C. American Wood Preservers Bureau (AWPB):
   1. AWPB Standard LP Series

D. Truss Plate Institute
   1. Recommended Code of standard practice for the metal plate connected wood truss industry

E. Factory Mutual System (FM):
   1. FM Class "I" or "A"

F. American Society for Testing and Materials (ASTM):

1.	ASTM A307	Spec. for Carbon Steel Externally Threaded Standard Fasteners
2.	ASTM A446	Spec. for Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process, Structural (Physical) Quality
3.	ASTM A525	Spec. for General Requirements for Sheet Steel, Zinc Coated (Galvanized) by the Hot Dip Process
4.	ASTM D226	Spec. for Asphalt - Saturated Organic Roofing Felt for Use in Membrane Waterproofing and Built-up Roofing

G. Federal Specifications (FS):
   1. FS-FF-N-105 Nails, Brads, Staples and Spikes: Wire, Cut and Wrought
   2. FS-FIF-B-561 Bolts (Screw), Lag

1.03 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300, Submittals including:
   1. Submit shop drawings and manufacturer's literature for all metal connectors for review.

PART 2 - PRODUCTS

2.01 LIGHT FRAMING

A. General
   1. Seasoning: S-Dry
   2. Pressure treat all lumber in contact with concrete, masonry, earth or water.

B. Studs (2x4 - 2x6):
   1. Hem-Fir
   2. No. 2 or better.

C. Plates, Rafters, Cripples, Blocking:
   1. Hem-Fir
   2. No. 2 or better.

D. Headers in Bearing Walls:
   1. Douglas Fir, WWPA grading rules.
   2. No. 1 or better.

E. Stringers:
   1. Douglas Fir-Larch
   2. No. 1 or better.
   3. Minimum 3½-inch effective depth after notching.

2.02 PLYWOOD

A. Conform to APA, group 2.

B. Sheathing
   1. Five-eighths inch C-D, int. grade, ext. glue 32/16.
      a. Roof sheathing to 24 inches O.C.
      b. Wall sheathing and wind bracing to 24 inches O.C.

2.03 WOOD PRESERVATIVE

A. Preservative:
   1. ACQ (Alkaline Copper Quaternary), or equal.

B. Salt retention shall not be less than 40 pounds per cubic foot of wood. All treated lumber shall be suitably marked.

2.04 ROUGH HARDWARE

A. Nails and Spikes
   1. Common
   2. Galvanized for exterior use.
   3. FS-FF-N-105.

B. Machine Bolts: ASTM A307

C. Lag Bolts: FS-FF-B-561

D. Framing Anchors and Hangers: Teco, Simpson, or equal.

2.05 MISCELLANEOUS

A. Building Paper
1. Asphalt saturated felt, non-perforated, 30 pound, ASTM D226, Type 1.

B. Sill Sealer
1. Glass fiber resilient insulation fabricated in strip form for use as sill seal. One inch nominal thickness compressible to 1/32 inch.

C. Air Infiltration Paper
1. 6 mil thick fabric, very fine, high density polyethylene fibers (transmission rate 51.3 grams per 100 sq. in. in 24 hours). Lap all joints a minimum of 12 inches.

PART 3 - EXECUTION

3.01 FRAMING

A. General
1. Select lumber so knots and defects will not interfere with placing of fasteners.
2. Set horizontal and sloped members with crown up.
3. Do not notch, cut or bore frame members for pipe conduits or ducts unless indicated otherwise.
4. Do not shim framing components.
5. Unless otherwise specified, provide preservative-treated framing members when:
   a. Set in concrete.
   b. In contact with concrete slabs on grade.
6. Do not rip treated wood members.

B. Bearings
1. Make full bearings unless otherwise indicated.
2. Notch sloped framing members to provide uniform bearing surfaces.

C. Bridging
1. Provide where joists exceed spans of eight feet.
2. Distance between lines of bridging or bridging and bearings shall not exceed eight feet.

D. Blocking
1. Provide as necessary for sheathing, subflooring and fire stopping.

E. Framing Anchors and Hangers
1. Provide hangers at joists not supported by bearing surfaces.
2. Fasten anchors and hangers in accordance to manufacturer's recommendations.

F. Install plumb and square to building lines.

G. Brace each truss as it is being installed.

H. Shim as required at bearing points

I. Anchor each truss to building with hot dip galvanized hold down anchors and fasteners.

3.02 PLYWOOD SHEATHING INSTALLATION

A. General
1. Place panels on minimum of three supports.
2. Place long dimension of panel perpendicular to supports.
3. Unless indicated otherwise, center end joints over supports.
4. Stagger end joints.
5. Provide panel clips on roof sheathing when supports exceed 16 inches on center.
6. Fasten ceiling panels with drywall screws, 1-3/4 inch long minimum placed 12-inches on center.
7. Caulk gaps in exposed plywood ceiling panels before painting.

B. Protect plywood from moisture until permanent covering or finish is applied.

3.03 FASTENING

A. Nailing
1. As a minimum, comply to the following schedule:

PLYWOOD CONNECTION	NAILING
Edge	8d at 6" o.c.
Center	6d at 10" o.c.

B. Bolting
1. Provide where shown on plans.
2. Drill holes 1/16 inch larger in diameter than bolt being used.
3. Do not bear bolt threads on wood.
4. Provide washers under all nuts.
5. Provide washers under bolt heads when bearing on wood.

C. Lag Bolts
1. Provide where shown on plans.
2. Bore lead holes same diameter as roof of threads.
3. Shank hole shall be same diameter and length as shank.

- END OF SECTION -

SECTION 06185

STRUCTURAL GLUED LAMINATED TIMBER

PART 1 – GENERAL

1.01 SUMMARY

A. Related Documents:
   1. Drawings and general provisions of the Contract, including General and Supplementary Conditions.
   2. Section 01300, Submittals.
   3. Section 06100, Rough Carpentry.

B. This section includes structural glued laminated timber elements.

C. Structural glued laminated (glulam) timber is defined to include wood members fabricated from 1 inch (25 mm) or 2 inch (50 mm) nominal thickness lumber, glued face-to-face to a depth of four or more laminations.
   1. Provide connectors, anchors, and accessories necessary to interconnect and secure glulam members to building structure.

D. The types of structural glued laminated units specified include the following:
   1. Straight beams, including girders and purlins, and cambered members.
   2. Curved or arched structural members (curved glue lines).
   3. Columns, including posts and standards.
   4. Prefabricated trusses with chords of glued laminated timber.

1.02 SUBMITTALS

A. General: Submit the following according to Conditions of Contract and Division Specification Sections.

B. Product data including specifications and installation instructions covering lumber, adhesives, fabrication process, accessories and protection.
   1. Submit certification indicating glued laminated timbers comply with requirements of ANSI/AITC A190.1.

C. Samples approximately 5" x 6" long, full width and depth, showing range of variation expected in appearance of structural glued laminated units, including any specified treatment. Samples will be reviewed for color, pattern and texture only. Compliance with other requirements is exclusive responsibility of Contractor.

D. Shop drawings showing full dimensions of each member and layout of entire structural system. Show large-scale details of connections, connectors, and other accessories. Indicate species and laminating combination, adhesive type, and other variables in required work. Shop drawings shall be prepared under the supervision of a professional engineer licensed in the state where the material is manufactured and installed.

E. Where indicated on the drawings, final design of the glued laminated structural units shall be provided by the manufacturer. Provide complete design calculations prepared by a professional

engineer, experienced in the design of the type of glued laminated timber used in this project, licensed in the state where the material is manufactured and installed.

1.03 QUALITY ASSURANCE

A. Standards: Comply with ANSI/AITC A 190.1--2007, "Structural Glued Laminated Timber."

B. Manufacturer Qualification: Provide factory-glued structural units, produced by an AITC-licensed firm qualified to apply the AITC Quality Inspected mark.

C. Factory-mark each piece of glued laminated structural units with AITC Quality Inspected mark.
   1. Place AITC mark on timber surfaces which will not be exposed in completed Work.

D. Installer: Firm that has demonstrated competence specializing in installing glued laminated timber for at least 5 years.

1.04 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with provisions of AITC 111, "Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage, and Erection".

PART 2 - PRODUCTS

2.01 STRUCTURAL GLUED LAMINATED UNITS

A. Lumber: Comply with ANSI/AITC A190.1 and applicable lumber association standards cited therein for grades required to achieve glulam requirements for design values, appearance, fabrication limitations, and species.

B. Stress Values for Beams, Purlins, and Arches: Glued laminated members to be sized by manufacturer. Laminating combinations to be determined by manufacturer.

C. Lumber Species: Southern Yellow Pine (no mixed species allowed) with moisture content average of 12%, maximum of 15%. Where wet use is indicated use decay resistant Alaska Yellow Cedar.

D. Adhesive: Water-proof complying with ANSI/AITC A190.1--2007, wet-use type.

E. End Sealer: Manufacturers standard, transparent, colorless wood sealer, effective in retarding transmission of moisture at cross-grain cuts.

F. Penetrating Sealer: Manufacturers standard, translucent, penetrating wood sealer, that will not interfere with application of wood stain and transparent finish, or paint finish.
   1. Refer to Division 9 Sections for required field-applied finishes.

G. Connectors, Anchors, and Accessories: Provide fabricated steel [ASTM A 36 (ASTM A 36M)] shapes, plates, and bars, welded into assemblies of types and sizes indicated. Provide steel bolts (ASTM A 307), lag bolts, nails, and other standard fasteners as required for installation.
   1. Finish: Finish fabricated assemblies with rust-inhibitive primer.
   2. Wet-Use Finish: Where wet-use glulam work is indicated, finish fabricated assemblies with hot-dip zinc coating (ASTM A 153), including bolts and other fasteners.

2.02 FABRICATION

A. General: Comply with ANSI/IAITC A190.1--2007 in providing units indicated; where dimensions are not completely documented, provide manufacturer's standard sizes and shapes required to fulfill indicated performances.
   1. Shop-fabricate for connections and connecting hardware to greatest extent feasible, including drilling of bolt holes.

B. Appearance Grade: Provide Architectural appearance grade units complying with AITC 110.

C. Camber: The required camber for fabricating each member as determined by the manufacturer, and may be either circular or parabolic, at manufacturers option.

D. End-Cut Sealing: Immediately after end-cutting each member to final length, and after wood treatment (if any), apply a saturation coat of end sealer to ends and other cross-cut surfaces.

E. Seal Coat: After fabricating and end-coat sealing, apply a saturation coat of penetrating sealer on surfaces of each unit, except for treated wood where treatment has included a water repellent.

F. Factory Finish: Apply one coat of manufacturers standard semi transparent oil base stain, color as selected by the architect from manufacturers standard colors. Hand apply stain to ensure consistent finish.

G. Factory Applied Protection: Individually wrap glued laminated timbers with manufacturers standard water-resistant, plastic coated paper.

2.03 ROOF DECKING

A. All roof deck shall be No. 1 grade kiln dried Douglas Fir, Southern Pine, Ponderosa Pine, 2 by 6, S4S, T & G, V-joint. Decking shall be combination one-span, two-span continuous.

PART 3 – EXECUTION

3.01 INSTALLATION

A. General: Install miscellaneous steel connectors, anchors, and accessories.

B. Plan and execute erection procedures so that close fit and neat appearance of joints and structure as a whole will not be impaired. When hoisting members into place, use padded or non-marring slings, and protect corners with wood blocking.

C. Adequately brace members as they are placed to maintain safe position until full stability is provided.

D. Cutting: Avoid cutting glulam members during erection. Except for fastener drilling and other minor cutting, coat cuts with end sealer.

E. Handle and temporarily support members to prevent visible surface damage.

F. Do not remove wrapping on individually wrapped members until it will serve no useful purpose, including protection from weather, soiling and damage from work of other trades. However, exposing portions of members to sunlight can cause non uniform "UV" staining. Fully covering

or fully exposing members will help minimize non-uniform staining. Shipping wrap is intended to protect members from soiling during shipping. This same wrap may be used for protection from precipitation or sun staining. Due to the possibility of varying conditions at the site, a determination of the suitability and the maintenance of the shipping wrap for job site protection must be made according to those conditions.

G. Apply bead of nonstructural joint sealant under each tongue and groove at outside wall supports for an airtight seal.

H. Nail decking to supports according to AITC recommendations. Provide temporary waterproof covering to protect exposed decking prior to applying finished roofing.

I. Repair damaged surfaces and finishes after completing erection and removing wrappings, or replace damaged members as directed where damage is beyond acceptable repair.

3.02 PROTECTION

A. General: Control heating, ventilating, and air conditioning in building to avoid damage to or deterioration of glulam work.

- END OF SECTION -

SECTION 06200

FINISH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

A. Work included in this section:
   1. Running and standing trim.
      a. Interior.

1.02 REFERENCE STANDARDS

A. Western Wood Products Association (WWPA).

B. Redwood Inspection Service (RIS).

C. National Hardwood Lumber Association (NHLA).

D. West Coast Lumber Inspection Bureau (WCLIB).

E. American Plywood Association (APA):
   1. APA 303

F. Architectural Woodwork Institute "Quality Standards" (AWI).

G. National Bureau of Standards - Voluntary Product Standard (PS):
   1. PSI Construction and Industrial Plywood.
   2. PS 20 American Softwood Lumber Standard.
   3. PS 51 Hardwood and Decorative Plywood.
   4. PS 56 Structural Glued Laminated Timber.

H. American Society for Testing and Materials (ASTM):
   1. ASTM A153 Spec. for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

1.03 SUBMITTALS

A. Submit the following in accordance with Division I section "Submittals."
   1. Samples for each species and cut or pattern of following:
   2. Interior standing trim.

1.04 PROJECT/SITE CONDITIONS

A. Conditioning
   1. Finish carpentry shall be installed after temperature and relative humidity conditions are stabilized and maintained in installation area.

PART 2 - PRODUCTS

2.01 INTERIOR TRIM

A. For stained or clear finish:
   1. Plain sawn red oak conforming with NHLA:
      a. Grade: "Custom."

2.02 PLYWOOD FOR PAINTED FINISH

A. For Interior Use
   1. Any softwood species:
      a. Exterior type (A-C plywood).

2.03 MOISTURE CONTENT

A. Provide seasoned, kiln-dried (KD) lumber with a moisture content complying with grading rules of applicable grading and inspection agency.

2.04 FASTENERS

A. Fasteners for exterior use shall be hot dip galvanized in accordance with ASTM A153.

PART 3 - EXECUTION

3.01 PREPARATION

A. Coordinate work with other trades.

B. Provide anchorages as required.

C. Condition wood material to average humidity of installation area.

3.02 TRIM INSTALLATION

A. Provide lumber in sizes, cuts, and patterns shown on plans:
   1. Comply with PS 20.

B. Lumber for interior trim:
   1. Stained or clear finish: Use pieces of solid stock.
   2. Painted finish: Use either glued-up or solid stock.

C. Install work to following tolerances:
   1. Plumb and level: 1/8inch in 8 feet.
   2. Maximum offsets in flush adjoining: 1/8inch.
   3. Maximum offsets in revealed adjoining surfaces: 1/8inch.
   4. Shim as needed with concealed shims.

D. Use lumber in full length pieces and minimize number of joints and:
   1. Stagger joints in adjacent and related members.
   2. Cope at returns and miter at comers to produce tight fitting joints:
      a. Joints shall have full surface contact throughout length of joint.
   3. Exterior joints shall be fitted to be water resistant.

E. When prefinished matching fasteners are not required, use finishing nails as follows:
   1. Countersink.
   2. Putty countersunk holes flush with surface using material matching final finish.

3.03 ADJUSTMENT, CLEANING, FINISHING, AND PROTECTION

A. Replace damaged and defective work:
   1. Sandpaper and hammer marks will not be accepted.

B. Adjust joinery for uniform appearance.

C. Clean finish work and touchup shop-applied finishes.

D. Protect finish work until final acceptance of project.

- END OF SECTION -

SECTION 06310

PRESSURE TREATED WOOD

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section includes providing material and labor necessary to construct pressure treated wood structures.

B. Related Sections and Divisions:
1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals
3. Section 06100, Rough Carpentry
4. Section 06200, Finish Carpentry

1.02 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300, Submittals including:
1. Identifying brand shall contain the following:
   a. Supplier's brand.
   b. Plant designation.
   c. Date of treatment.
   d. Species of wood and preservatives.
   e. Retention.
   f. Class and length.
2. Identify pressure treated wood in accordance with AWPA M6.
3. Compliance with pertinent codes and regulations of governing authority.

1.03 REFERENCE STANDARDS

A. American Wood Preservers Association (AWPA):
1. AWPA C1 All Timber Products - Preservative Treatment by Pressure Processes
2. AWPA C9 Plywood - Preservative Treatment by pressure Processes
3. AWPA M4 Standard for the Care of Preservative-Treated Wood Products
4. AWPA M6 Brand Used on Forest Products
5. AWPA P5 Standard for Waterborne Preservatives

B. American Wood Preservers Bureau (AWPB):
1. AWPB LST Standard for Softwood Non-Structural Landscape Timber Peeler Cores Pressure Treated with Waterborne Preservatives for Ground Contact Use

C. American Society for Testing and Materials (ASTM):
1. ASTMA153 Spec. for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

D. Federal Specifications (FS):
1. FS-TT-W-550G Wood Preservative Chromated Copper Arsenate Mixture
2. FS-TT-W-5711(2) Wood Preservation Treating Practices

PART 2 - PRODUCTS

2.01 WOOD SPECIES

A. Treated wood shall be selected from following:
   1. Douglas Fir (DF)
   2. Jack Pine (JP)
   3. Lodgepole Pine (LP)
   4. Ponderosa Pine (WP)
   5. Red (Norway) Pine (NP)
   6. Southern Pine (SP)
   7. Western Larch (WL)
   8. Western Red Cedar (WC)

2.02 PRESERVATIVES

A. Conform to following:
   1. ACQ-94

2.03 TREATMENT PROCESS

A. Conform to following:
   1. AWPA C20-96, C27-96, C2-96, C22-96

2.04 FASTENERS, HARDWARE, AND ACCESSORIES

A. Stainless Steel
   1. Type 304 or 316.

B. Galvanized Steel
   1. Conform with ASTM A153.

2.05 TREATMENT REQUIREMENTS

A. Unless indicated otherwise, preservative shall be advanced copper & quat. (ACQ).

B. Retention minimum:
   1. Dimension lumber, timber, and plywood:
      a. Above Ground: 0.25 lbs/cu. ft.
      b. Soil and Fresh Water Contact: 0.40 lbs/cu. ft.
   2. Posts:
      a. Sawn: 0.60 lbs/cu. ft.

C. Moisture content, maximum after treatment:
   1. Plywood: 18 percent
   2. Dimension Lumber and Timber: 19 percent

D. Plywood for treatment shall be exterior glued.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Provide treated wood and accessories in types and sizes as required by drawings.

B. Treated wood shall be supplied in dimensions which will minimize on-site cutting.

C. Holes for drift bolts and dowels shall be drilled 1/16 inch less than bolt diameter.

D. Holes for machine bolts or U-bolts shall be drilled same diameter as bolt.

E. Field cuts, holes, and abrasions shall be treated in accordance with AWPA M4 with a preservative equal to original.

- END OF SECTION -

7

DIVISION 7

THERMAL AND MOISTURE PROTECTION

SECTION 07210

BUILDING INSULATION

PART 1-GENERAL

1.01 SUMMARY

A. Work Included: This section includes providing building insulation including:
   1. Above and below grade rigid foam insulation.
   2. Batt insulation (thermal).
   3. Masonry insulation.

B. Related Section and Divisions:
   1. Applicable provisions of the General Conditions shall govern the work in this section.
   2. Section 01300, Submittals.

1.02 QUALITY ASSURANCE

A. Deliver material to site in manufacturer's packaging, labeled as to product and "R" factor.

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals.
   1. Manufacturer's data and certification of compliance with this section.

PART 2 - PRODUCTS

2.01 RIGID FOAM INSULATION

A. Closed cell foamed plastic, extruded polystyrene type.

B. Aged "R" factor at 40 degrees F of 5.4 per inch thickness.

C. Building perimeter insulation and cavity wall insulation acceptable products.
   1. "Foamular" by U.C. Industries, a joint venture of United States Gypsum and Condec Corp., Chicago, Illinois.
   2. "Styrofoam Square Edge or Score Board" by Dow Chemical, Midland, Michigan.
   3. Insulation shall be 2-inch thick for building perimeter and 1½ inch for cavity walls.

D. Building structural insulation acceptable products. Use in multiple layer concrete slab construction.
   1. "Styrofoam High Load 60" by Dow Chemical, Midland, Michigan, or equal.
   2. Thickness as shown on structural details.

2.02 FIBERGLASS THERMAL BATT INSULATION

A. Owens-Coming, Certainteed, or equal.

B. Exterior wall insulation shall be an unfaced, fiberglass insulation with a minimum R valve of 21 and shall include a vapor barrier.

C. Ceiling insulation shall be fiberglass insulation with a minimum R valve of 38 and vapor barrier. Cellulose products shall not be used.

D. Batt insulation in interior stud walls shall be an unfaced fiberglass acoustical insulation complying with ASTM C665, Type I. The wall system shall have a STC of 46 with 3½ inches of insulation.

2.03 SPRAYED-IN-PLACE FOAM

A. Core fill sod or equal.

B. 8-inch block/132 lb density, "R" value 4.4.
12-inch block/132 lb density, "R" value 7.1.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Rigid Insulation—Foundation Walls and Under Floors
1. Insulation shall be laid dry against the foundation walls as backfill is placed. Insulation shall be located at all perimeter and basement walls of building and structures containing areas that may be occupied.
2. Perimeter wall insulation used on buildings without basements shall be 40 inches high, located on the inside of the foundation walls. Insulation shall be 48 inches high located on the outside of walls with top if insulation 4 inches below final grade.
3. Install insulation horizontally below floor and sidewalk slabs at entrances and stoops, and in multiple layer(s) concrete slab construction.

B. Rigid Insulation Cavity Walls
1. Adhesive for adhering insulation to backup wall shall be a s recommended by the insulation manufacturer.

C. Batt Insulation
1. Install as shown on plans 2'-0" in ends of precast plank.
2. Carefully cut insulation around wall penetrations.
3. Friction fit insulation between studs.

D. Sprayed-in-place foam
1. Install per manufacturer's instructions by certified installers.

- END OF SECTION -

SECTION 07311

ASPHALT SHINGLES

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Provide shingles and accessories as shown on the plans.

B. Related sections and divisions:
   1. Applicable provisions of the General Conditions shall govern the work in this sections.
   2. Section 01300, Submittals.

1.02 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300, Submittals including:
   1. Product data for each type of product specified, including details of construction relative to materials, dimensions of individual components, profiles, textures, and colors.
   2. Samples for initial selection purposes in form of manufacturer's sample finishes showing full range of colors and profiles available.

1.03 QUALITY ASSURANCE

A. Fire Performance Characteristics
   Provide products that are identical to those tested for the specified fire performance characteristics by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction.

B. Identify products with appropriate markings of applicable testing and inspecting organization.

C. Fire Resistance Ratings
   As indicated by reference to design designations in UL "Fire Resistance Directory."

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to Project site in manufacturer's unopened bundles or containers with labels intact.

B. Handle and store materials at Project site to prevent water damage, staining, or other physical damage. Store roll goods on end. Comply with manufacturer's recommendations for job site storage, handling, and protection.

1.05 PROJECT CONDITIONS

A. Weather Conditions
   Proceed with work only when existing and forecasted weather conditions will permit work to be installed in compliance with manufacturer's recommendations and when substrate is completely dry.

1.06 EXTRA MATERIALS

A. Deliver extra materials to Owner.
   1. Furnish extra materials matching products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.
   2. Furnish quantity of full-size asphalt shingles equal to 2 percent of amount installed.

1.07 WARRANTY

A. Warranty period is 40 years after date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer shall be Certainteed or equal.

2.02 SHINGLES

A. CertainTeed Landmark 40: Conforming to ASTM D 3018 Type I – Self-Sealing; UL Certification of ASTM D 3462, UL 997 80-mps Wind Resistance, and UL Class A Fire Resistance; glass fiber mat base, ceramically colored/UV resistant mineral surface granules across entire face of shingle.
   1. Type: Two-piece laminated shingle.
   2. Algae-resistant (Landmark 40 AR).
   3. Warranty: 40-year limited warranty plus 5-year SureStart warranty.
   4. Weight: 270 pounds per square (100 square feet) (13.2 kg/sq m).
   5. Color: As selected by Owner from manufacturer's standards.

B. Hip and Ridge Shingles
   1. Job-fabricated units cut from actual shingles used.

2.03 ACCESSORIES

A. Provide one layer of No. 15 unperforated organic felt complying with ASTM D226, Type 11; 36 inches wide.

B. Perimeter Underlayment
   1. Polyethylene-sheet-backed rubberized asphalt membrane, 40 mils thick.
   2. Provide primer when recommended by underlayment manufacturer.
   3. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
      a. "Bituthene Ice & Water Shield," W.R. Grace & Co.
      b. "Polyken 640 Underlayment Membrane," Polyken Technologies.
      c. "Polyguard Deck Guard," Polyguard Products, Inc.
      d. "Ice Guard Membrane No. 108-AG," Royston Laboratories, Inc.
      e. "Jiffy Seal Ice and Water Guard," Protecto Wrap Co.

C. Asphalt Plastic Cement

1. Non-asbestos fibrated asphalt cement complying with ASTM D 4586, designed for trowel application.

D. Nails
1. Aluminum or hot-dip galvanized steel, 11 or 12-gauge, sharp-pointed, conventional roofing nails with barbed shanks, minimum 3/8 inch diameter head, and of sufficient length to penetrate ¾ inch into solid decking or to penetrate through plywood sheathing.
2. Material of nails in contact with flashing shall match materials selected for flashing to prevent galvanic action.

E. Metal Drip Edge
1. Minimum 0.024-inch mill finish aluminum sheet, brake-formed to provide 3-inch roof deck flange and 1½ inch fascia flange with 3/8 inch drip at lower edge.
2. Furnish in lengths of 8 or 10 feet.

F. Metal Flashing
1. 0.024-inch mill finish sheet aluminum, job-cut to sizes and configurations required.
2. Valley flashing shall be preformed with inverted v profile at center of valley.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrate for compliance with requirements for substrates, installation tolerances, and other conditions affecting performance of work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Coordinate installation with flashings and other adjoining work to ensure propersequencing. Do not install roofing materials until all vent stacks and other penetrations through roof sheathing have been installed and are securely fastened against movement.

3.03 INSTALLATION

A. Comply with manufacturer's installation instructions and recommendations, but not less than recommended by "The NRCA Steep Roofing Manual."

B. Felt Underlayment
1. Apply one layer of felt underlayment horizontally over entire surface to receive asphalt shingles, lapping succeeding courses a minimum of 2 inches, end laps a minimum of 4 inches, and hips and valleys a minimum of 6 inches.
2. Fasten felt with sufficient number of roofing nails or noncorrosive staples to holdunderlayment in place until asphalt shingle application.
3. Provide additional layer of felt underlayment for roofs with slope of 3 inches per foot or more.

C. Perimeter Underlayment

1. Apply minimum 24-inch-wide layer of perimeter underlayment at eaves.
2. Extend perimeter underlayment at eaves a minimum of 24 inches inside exterior all line.
3. In addition to eaves, apply perimeter underlayment at entire perimeter of surfaces to receive shingles, including ridges, valleys, and rakes.

D. Install shingles beginning at lower end with a starter strip of roll roofing or inverted shingles with tabs removed. Fasten shingles in pattern, with weather exposure, and using number of fasteners per shingle as recommended by manufacturer. Use vertical and horizontal chalk lines or premarked underlayment to ensure straight coursing.
1. Cut and fit asphalt shingles at ridges and edges to provide maximum weather protection.
2. Provide same weather exposure at ridges as specified for roof.
3. Lap shingles at ridges to shed water away from direction of prevailing wind.
4. Fasteners at ridges shall be of sufficient length to penetrate sheathing as specified.
5. Pattern: ½ spacing offset at succeeding courses.

E. Flashing
1. Install metal flashing as indicated and in accordance with details and recommendations of the "Asphalt Roofing" section of "The NRCA Steep Roofing Manual."

3.04 ADJUSTING

A. Replace any damaged materials installed with new materials meeting specified requirements.

- END OF SECTION -

SECTION 07600

FLASHING AND SHEET METAL

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included: This section includes providing flashing and sheet metal in accordance with this section including counter flashing, elastic flashing, soffit, fascias, gutters and downspouts.

B. Related Section and Divisions:
   1. Applicable provisions of the General Conditions shall govern the work in this section.
   2. Section 01300, Submittals.

1.02 QUALITY ASSURANCE

A. Installation shall be performed by personnel normally engaged in this type of work.

1.03 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):
   1. ASTM A526 Spec. for Steel Sheet, Zinc Coated (Galvanized) by the Hot Dip Process, Commercial Quality.
   2. ASTM B209 Spec. for Aluminum and Aluminum Alloy Sheet and Plate.
   3. ASTM C920 Spec. for Elastomeric Joint Sealants.
   4. ASTM D746 Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.

B. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA):
   1. SMACNA Architectural Sheet Metal Manual.

1.04 WARRANTY

A. Provide a 20-year warranty on Kynar finish coatings.

B. Acrylic finish – exterior exposure: Fade shall not exceed more than 5 color difference units within 5 years after removal of external deposits per ASTM Test D224.

PART 2 - PRODUCTS

2.01 SHEET METAL

A. Galvanized
   1. ASTM A526, G90 coating.
   2. Minimum 24 gauge.
   3. Kynar shop finish.

B. Aluminum
   1. ASTM B209.
   2. Alloy 3105, temper H18 for Soffit and H16 for Siding & Fascia.
   3. Minimum 0.019 inch for Soffit Panels & Siding, .024 for Fascia.

4. Acrylic shop finish.
5. Rollex or equal Soffit Panel SYS316CV, Siding D4HT, Gutter Coil Stock Skid.

2.02 ELASTIC SHEET FLASHING

A. Manufacturer's standard black, nonreinforced flashing conforming with following:
1. 50 to 65 mil thickness.
2. Brittleness temperature of -30 degrees F (ASTM D746).

B. Acceptable synthetic rubber sheet material:
1. Neoprene.
2. Butyl.
3. EPDM.

2.03 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Fasteners and metal accessories:
1. Same metal as flashing/sheet metal.
2. Match finish.

B. Elastomeric sealant for movable, non-expansion type joints:
1. Comply with ASTM C920.

C. Epoxy seam sealer for non-moving joints:
1. Two- part noncorrosive compound.
2. For exterior and interior use.

D. Adhesives: Waterproof/weather resistant.

E. Comply with sheet manufacturer's recommendations for materials and accessories.

PART 3 - EXECUTION

3.01 FABRICATION AND INSTALLATION

A. Shop fabricate work to greatest extent possible.

B. Comply with SMACNA "Architectural Sheet Metal Manual."

C. Provide flashing and sheet metal as detailed on drawings:
1. Apply to a clean an unobstructed surface.

D. Provide a corrosion resistant barrier between dissimilar metals:
1. Bituminous coating.
2. As recommended by sheet manufacturer.

E. Install work watertight, without waves, warps, buckles, fastening stresses or distortion allowing for expansion and contraction.

F. Hem exposed edges.

G. Angle bottom edges of exposed vertical surfaces to form drips.

3.02 CLEANING AND PROTECTION

A. Clean exposed metal surfaces after completion of work.

B. Protect metal finishes until final acceptance of project.

-END OF SECTION-

SECTION 07720

ROOF ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:
   1. Prefabricated curb and equipment support units.

1.02 REFERENCED STANDARDS

A. American Architectural Manufacturers Association:
   1. AAMA 607.1-1977 Voluntary Guide Specification and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum

B. American Society for Testing and Materials:
   1. ASTM A446/A 446M-89 Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
   2. ASTM A525-90 Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
   3. ASTM B209-90 Specification for Aluminum and Aluminum-Alloy Sheet and Plate
   4. ASTM C920-87 Specifications for Elastomeric Joint Sealants
   5. ASTM D4586-86 Specification for Asphalt Roof Cement, Asbestos Free

C. American Wood Preservers Association:
   1. AWPA C2-89 Lumber, Timber, Bridge Ties and Mine Ties-Preservative Treatment by Pressure Process

1.03 SUBMITTALS

A. Submit the following according to Conditions of Contract and Division I Specification Sections.
   1. Product data for each type of product specified. Submit manufacturer's detailed technical product data, installation instructions and recommendations, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.
   2. Shop drawings showing fabrication and installation of each roof accessory specified including fully dimensioned plans, elevations, sections, details of components, and attachments to other units of Work. Also show layout, anchorage details, rough-in requirements, and conditions on the roof or for other accessories.

1.04 QUALITY ASSURANCE

A. Standards
   Comply with the following:
   1. SMACNA "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap-flashing to coordinate with type of roofing indicated.
   2. NRCA "Roofing and Waterproofing Manual" details for installation of units.

1.05 DELIVERY, STORAGE AND HANDLING

A. Comply with Division 1, Section "Materials and Equipment."

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers
Subject to compliance with requirements, provide products by one of the following:
1. Prefabricated Curb and Equipment Support Units:
   a. Curbs, Inc.
   b. Custom Curb, Inc.
   c. The Pate Co.
   d. Roof Products and Systems Corp.

2.02 MATERIALS, GENERAL

A. Aluminum Sheets
ASTM B 209 for Alclad alloy 3005H25 or alloy and temper required to suit forming operations with mill finish, unless indicated otherwise.

B. Aluminum Shapes
ASTM B 221 alloy 6063-T52 or alloy and temper required to suit structural and finish requirements. Mill finish, unless indicated otherwise.

C. Stainless Steel Shapes Type
304 stainless steel.

D. Wood Nailers
Softwood lumber, pressure treated with water-borne preservatives for above-ground use, complying with AWPA C2; not less than 1-1/2 inch thick.

E. Fasteners
Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by manufacturer. Match finish of exposed fasteners with finish of material being fastened.
1. Where removal of exterior exposed fasteners affords access to building, provide nonremovable fastener heads.

F. Gaskets
Manufacturer's standard tubular or fingered design of neoprene or polyvinyl chloride, or block design of sponge neoprene.

2.03 FINISHES

A. General
Comply with NAAMM "Metal Finishes Manual" for recommendations on applying and designating finishes.

B. Class 1, Clear-Anodized Finish
AA-C22A41 (Chemical Finish: etched, medium matte; Anodic Coating: Class I Architectural, clear film thicker than 0.7 mil) complying with AAMA 607. 1.

2.04 PREFABRICATED CURBS AND EQUIPMENT SUPPORTS

A. Comply with loading and strength requirements as indicated where units support other work. Coordinate dimensions with rough-in information or shop drawings of equipment to be supported.
1. Fabricate of structural-quality aluminum, welded joints.
2. Provide complete installation coordinated with roof insulation thickness. Provide preservative-treated wood nailers at tops of curbs, coordinate with thickness of insulation and roof flashing as indicated, tapered as necessary to compensate for roof deck slopes. Provide with cant strips and base profile when curb is integrated with a built-up roof.
3. Unless otherwise indicated or required for strength, fabricate roof curbs of minimum .060 aluminum, and to minimum height of 12 inches.
4. Fabricate equipment supports weld aluminum or type 304 stainless steel per manufacturer's recommendations

PART 3 - EXECUTION

3.01 INSTALLATION

A. General--Comply with manufacturer's instructions and recommendations. Coordinate with installation of roof deck and other substrates to receive accessory units, vapor barriers, roof insulation, roofing and flashing, as required, to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight. Anchor units securely to supporting structural substrates, adequate to withstand lateral and thermal stresses, as well as inward and outward loading pressures.
1. Except as otherwise indicated, install roof accessory items according to construction details of NRCA "Roofing and Waterproofing Manual."

B. Isolation
Where metal surfaces of units are to be installed in contact with incompatible metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation.

C. Flange Seals
Unless otherwise indicated, set flanges of accessory units in a thick bed of roofing cement to form a seal.

D. Install base and cap flashing in accordance with roofing manufacturer's written instructions to assure compliance with roofing guarantee.

E. Operational Units
Test operate units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.

3.02 FIELD QUALITY CONTROL

A. Inspect for compliance with submittals.

3.03 CLEANING AND PROTECTION

A. Clean exposed metal and plastic surfaces according to manufacturer's instructions. Touch up damaged metal coatings.

- END OF SECTION -

SECTION 07920

JOINT SEALERS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included: This section provides joint sealers in accordance with plans and specifications.

B. Related Sections and Divisions: Applicable provisions of the General Conditions shall govern the work in this section.

1.02 QUALITY ASSURANCE

A. Obtain materials from a single manufacturer for each type of product required.

B. Perform a preconstruction field test to demonstrate adhesion ability to substrate surfaces.

1.03 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):
   1. ASTM C834 Spec. for Latex Sealing Compounds.
   2. ASTM C920 Spec. for Elastomeric Joint Sealants.

1.04 SUBMITTALS

A. Submit Manufacturers certification attesting to the suitability of their product in accordance with Section 01300, Submittals.

PART 2 - PRODUCTS

2.01 JOINT SEALANTS

A. Manufacturers:
   1. Tremc
   2. Sika Corporation, or equal.
   3. Or Equal.

B. Exterior Joints:
   1. Joints:
      a. Joints between cast-in-place concrete sections and precast concrete sections or each other.
      b. Expansion and control joints in concrete.
      c. Perimeters of door frames, window frames, louvers and similar opening, and where metal, wood or other materials abut or join masonry, cast-place concrete, and precast concrete or each other.
   2. Material:
      a. Tremco Dymeric, Sikaflex 1a, Sikaflex 2c NS.

b. Multipart polyepoxide urethane sealant, FS TT-S00227E, Class A, Type II, or ASTM C920, Type M, Grade NS (non-sag), Class 25, use NT, M, A, and O.

C. Exterior Horizontal Joints:
1. Joints:
a. Sidewalks, concrete floors, and driveways.
b. Where indicated on Drawings.
2. Material:
a. Tremco THC-900/901.
b. Multipart chemically curing polyurethane, FS TT-S-00227E, Class A, Type I, (Self-Leveling), or ASTM C920, Type M, Grade P, Class 25, use T, M, A, and O.

D. Interior Joints:
1. Expansion and Control Joints:
a. Tremco Dymeric, Sikaflex 2c NS, Sikaflex 15 LM.
b. Multipart Polyepoxide urethane sealant, FS TT-S-00227E, Class A, Type II, or ASTM C920, Type M, Grade NS, Class 25, use NT, M, A and O.
2. Perimeter of door frames, window frames louvers frames and similar openings:
a. Tremco DyMonic, or Sikaflex 15 LM.
b. One-part moisture curing, modified polyurethane sealant. FS TT-S-00230C, Class A, Type II, or ASTM C920, Type S, Grade NS, Class 25, use NT, M, A and O.

2.02 SUBMERGED JOINT SEALANTS

A. Manufacturers:
1. Thiokol Polymer Systems, Sika Corporation.
2. Or Equal.

B. Submerged, Non-Potable Water:
1. Primer: Thiokol FEC 2410, Sikaflex 429/202.
2. Sealant:
a. Thiokol 2282, Sikaflex 2c NS.
b. Multipart chemical curing, polysulfide sealant. ASTM C920, Type M, Grade NS.
3. Thickener: Cabosil fiberglass powder.

C. Submerged, Potable Water
1. Primer: Sikaflex 429/202
2. Sealant:
a. Sikaflex or 2c NS.

2.03 JOINT FILLERS FOR CONCRETE SLABS

A. General: Provide for sidewalks and drives.

B. Bituminous Fiber Joint Filler: Comply with ASTM D1751. Preformed strips of asphalt saturated fiberboard, or granulated cork with asphalt binder encased between 2 layers of saturated felt or glass-fiber felt of width and thickness indicated.

2.04 JOINT SEALANT BACKING

A. General:
   1. Provide sealant backings of material and type, which are non-staining; compatible with joint substrates, sealants, primers, and other joint fillers approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Backer Rods:
   1. Performed, compressible, resilient, nonwaxing, non-extruding strips of plastic foam of material indicated below, and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
   2. Flexible, open cell polyurethane foam or nongassing, closed-cell polyethylene foam.
   3. Plastic void cap strip expansion joint may be substituted for backer rods where bituminous joint fillers are used.

2.05 MISCELLANEOUS MATERIALS

A. Primer:
   1. Provide type recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

B. Cleaners for Nonporous Surfaces:
   1. Provide nonstaining, chemical cleaner of type acceptable to manufacturer of sealant and sealant backing materials, which are not harmful to substrates, and adjacent nonporous materials.

PART 3 - EXECUTION

3.01 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturers and following:
   1. Remove foreign material from joint substrates which could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
   2. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces to produce clean, sound substrate capable of developing optimum bond with joint sealants. Do not use acid wash. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
   3. Remove laitance and form release agents from concrete.
   4. Clean metal, glass, porcelain enamel, glazed surfaces or ceramic tile and other nonporous surfaces by means, which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming:
   1. Prime joint substrates where recommended by joint sealant manufacturer.
   2. Apply primer to comply with joint sealant manufacturer's recommendations.
   3. Confine primers to areas of joint sealant bond, do not allow spillage or migration onto adjoining surfaces.

C. Protection of Adjoining Surfaces:
   1. Prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears.
   2. Remove protection immediately after tooling without disturbing joint seal.

3.02 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply and:
   1. Elastomeric Sealant: ASTM C1193.

B. Installation of Sealant Backings:
   1. Install joint fillers of type indicated to provide support of sealants during application and at positions required to produce cross-sectional shapes and depths of installed sealants relative to joint widths, which allow optimum sealant movement capability.
      a. Do not leave gaps between ends of joint fillers.
      b. Do not stretch, twist, puncture, or tear joint fillers.
      c. Remove absorbent joint fillers, which have become wet prior to sealant application and replace with dry material.
   2. Install bond breaker tape between sealants and joint fillers, compression seals, or back of joints where required to prevent third-side adhesion of sealant to back of joint.
   3. Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.

C. Installation of Sealants:
   1. Sealants shall directly contact and fully wet joint substrates, completely fill recesses provided for each joint configuration and provide uniform, cross-sectional shapes, and depths relative to joint widths, which allow optimum sealant movement capability.

D. Tooling of Nonsag Sealants:
   1. Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint.
   2. Remove excess sealants from surfaces adjacent to joint.
   3. Do not use tooling agents, which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
   4. Concave joint configuration shall be in accordance with ASTM 1193, Figure A, unless otherwise indicated.

E. Installation of Submerged Sealants:
   1. Prime surfaces to receive sealant and install sealant in accordance with manufacturer's instructions.
      a. Vertical Surfaces: Add cabosil to sealant to thicken material so mixture hangs in joint.

3.03 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and reseal joints with new materials to produce joint sealant installations with repaired areas indistinguishable from original Work.

3.04 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

- END OF SECTION -

8

DIVISION 8

DOORS AND WINDOWS

SECTION 08110

STEEL DOORS, WINDOWS, AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section includes providing hollow metal steel doors, windows, and frames.

B. Related Sections and Divisions:
1. Applicable provisions of the General conditions shall govern the work in this section.
2. Section 01300, Submittals

1.02 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300, Submittals:
1. Product data for each type of door, window, and frame specified.
2. Door, window, and frame schedule for approval prior to manufacture, showing the following:
   a. Materials used in the manufacture of the doors, windows, and frames.
   b. Door and window styles.
   c. Door opening swing (or hand).
   d. Frame anchoring details.
   e. Quantities

1.03 QUALITY ASSURANCE

A. All materials shall be manufactured and installed according to the recommended standards of the Steel Door Institute (SDI).

B. All materials shall be shop fabricated with installation only at the job site.

C. Installation shall be done by experienced workers, qualified in this type of work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Doors and Frames
1. 1-3/4 inch Doors: 18 gauge cold-rolled steel.
2. 16 gauge galvanized steel sheets for exterior doors or high humidity a. 1-3/4 inch doors: Zinc-coated carbon steel complying with ASTM A526 hot dip galvanized according to ASTM A525 with A60 coating.
3. Frames: 16 gauge cold-rolled steel, according to SDI 100.
4. Hardware Reinforcing:
   a. Hinges (Doors and Frames): 8 gauge steel
   b. Locksets and Deadbolts: 14 gauge steel
   c. Closers: 12 gauge steel
   d. Pull Plates: 16 gauge steel

e. Surface Panic Hardware: 14 gauge steel
f. Kickplates: None Required

5. Core Material: Resin impregnated kraft honeycomb (interior doors).
6. Core Material: Urethane or polystyrene foam (exterior doors).

B. Steel window frames: 1.16 gauge cold-rolled steel.

C. Glass: ¼-inch polished plate.

2.02 FABRICATION

A. Doors
1. Full flush construction.
2. Face sheets formed from one sheet of material.
3. Fourteen gauge inverted top and bottom channel.
4. All welded construction.
5. Welds ground smooth.
6. Core material bonded to each face.
7. Full mortise hinges.
8. All openings for hardware shall be pre-cut at the factory.
9. All hardware locations shall be reinforced.
10. Clearances:
a. 1/8 inch at jambs and heads.
b. ¾ inch at bottom.
c. ¼ inch at meeting edges of pairs or doors.

B. Door frames
1. Welded:
a. Comers braced by welded splice plates.
b. Rabbet tack-welded on the inside of the comers.
c. Packaged with spreaders, designed to maintain the shape without warpage during shipping.
2. All hardware locations shall be reinforced.
3. Provide anchoring devices designed for the wall receiving the frame.
4. Faces of frames at joints shall be flush and the joint shall be a neat line with no gaps.
5. Full mortise hinges.
6. Mortises protected by metal plaster guards.
7. Two air cushion, gum rubber bumpers shall be mounted on lock jamb.

C. Window frames
1. Welded frames.
2. Face of frames at joints shall be flush and the joint shall be a neat line with no gaps.
3. Provide glazing bead attached with sheet metal screws.

D. Finish
1. All doors and frames shall be bonderized and painted with one coat of rust inhibitive zinc chromate primer, neutral grey, oven dried.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install steel doors, door & window frames, and accessories according to shop drawings, manufacturers' data, and as specified.

B. Frames shall be installed plumb, rigid, and in true alignment, and be fastened so as to retain their position and clearance during construction of partitions. Frames in masonry walls shall be filled with mortar as the wall is laid up.

C. When temperature conditions necessitate an additive to be used in the plaster or mortar to prevent freezing as the frames are installed, the inside of the frames shall be coated in the field with a corrosion inhibiting bituminous material by the contractor installing the frames.

D. Doors and frames shall be installed plumb and in true alignment in a prepared opening and the frames shall be fastened to achieve the maximum operating effectiveness and appearance of the entire unit.

E. Frames placed in masonry walls to have at least three wall anchors per jamb placed adjacent to hinge location on both sides.

3.02 ADJUSTING

A. All doors shall be adjusted for ease of operation and all hardware shall be adjusted for smooth performance to the satisfaction of the Owner.

B. Immediately after installation, sand smooth any rust-damaged areas of prime coat and apply touch-up of compatible air-drying primer.

- END OF SECTION -

SECTION 08112

FIBERGLASS REINFORCED PLASTIC DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section includes providing all labor and materials to install fiberglass reinforced plastic (FRP) doors and frames.

B. Related Sections and divisions:
1. Applicable provisions of the general conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Section 08710, Door Hardware.
4. Door schedule in drawings.

1.02 SUBMITTALS

A. Submit door and frame schedule for approval prior to manufacture, showing the following in accordance with Section 01300, Submittals:
1. Materials used in the manufacture of the doors and frames.
2. Door style.
3. Opening swing (or hand).
4. Frame anchoring details.
5. Finishes.
6. Color samples.

1.03 QUALITY ASSURANCE

A. All fiberglass doors and accessories shall be produced by a single Manufacturer.

B. All materials shall be shop fabricated with installation only at the job site.

C. Installation shall be done by experienced workers, qualified in this type of work.

D. Installation shall be plumb, square and neat in finished appearance.

E. Installation and anchoring hardware shall be Type 316 stainless steel.

1.04 PRODUCT HANDLING

A. All materials shall be delivered to the site in sealed, undamaged containers fully identified with manufacturer's name, brand, style, pattern and color. On receipt, materials shall be stored in original cartons, on end in such a way to prevent failing or damage to face comers and edges.

1.05 WARRANTY

A. Manufacturer shall unconditionally guarantee its doors for 5 years against failure due to corrosion from the specific environment named at the time of purchase.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

A. Chem-Prof Door Company or equal.

2.02 MATERIALS

A. Doors with Windows and Frames

1. Doors and frames shall be made of fiberglass reinforced plastic (FRP) using resins tailored to a specific corrosive environment and have a glass content of 25% by weight. They shall be flush construction having no seams or cracks. They shall have all mortises molded in by the manufacturer, be 1¾ inches thick, with a 15 mil (plus or minus 3 mil) color gelcoat, and have an R-factor of 12.
2. Styles and rails shall be constructed of 2 layers of 1.5 ounce per square foot fiberglass mat and one layer of 10 ounce per square yard fiberglass cloth. The style and rail shall be molded in one continuous piece to a U-shaped configuration and to the exact dimensions of the door.
3. Door plates shall be molded in I continuous piece with 2 layers of 1.5 ounces per square foot fiberglass mat and 16 ounces per square yard Unistrand roving.
4. Adequate reinforcing and compression members shall be used to accommodate surface hinges, closers, locks, kickplates, and panic hardware. All voids between the door plates shall be completely filled with the equivalent of 4-6 pound expanded polyurethane foam, having a flame spread of 25 or less per ASTM E84.
5. Double doors shall have the active leaf fitted with an interval FRP astragal.
6. All reinforcing resins shall have a fire retardant formulation plus Antimony Trioxide to achieve a flame spread of 25 or less per ASTM E-84 and be self extinguishing per ASTM D-635.
7. All windows shall be molded integrally so that no moisture may penetrate the window frame through the window lite structure. Windows shall be structurally retained by at least 4 fiberglass glazing pins and sealed in such a manner that the integrity of the seals remain intact.
8. Color shall be selected by Owner.
9. Reinforcement for mounting hinges, closers, etc. shall be mild steel plates strategically located. They shall be buried in a matrix of polyester material so that they will not be exposed.
10. The frame shall be of solid fiberglass construction.
11. All hardware (locksets, hinges, closers, etc.) shall be installed at the door manufacturing plant. The hardware manufacturer's warranty shall be included with the hardware installation. Hardware shall be as described in Section 08710, Door Hardware.

PART 3 - INSTALLATION

A. Doors with windows and frames shall be stored at the building site under cover in a manner that will prevent damage. The use of non-vented, plastic or canvas shelters which create a humidity chamber shall be avoided. If the cardboard wrapper on the door becomes wet, the carton shall be removed immediately. To promote air circulation, a 1/4" space shall be provided between the doors.

B. Frames shall be installed plumb, rigid and in true alignment, and be fastened so as to retain their position and clearance during construction of partitions.

C. Installer shall examine areas where doors are to be installed. He shall notify the Contractor, in writing, of defects or conditions that will be detrimental to the quality of finished job. Commencing work constitutes acceptance of existing conditions and responsibility for finished job.

D. Installer shall mate door to opening subject to manufacturer's recommendations. Note: Installer must not cut or otherwise alter the construction of the door to make the door fit the frame.

E. All doors shall be adjusted for ease of operation and all hardware shall be adjusted for smooth performance to the satisfaction of the Owner.

F. Installation shall be in strict compliance with manufacturer's written instructions using non-corrosive materials and methods.

- END OF SECTION -

SECTION 08710

DOOR HARDWARE

PART 1-GENERAL

1.01 SUMMARY

A. This section specifies door hardware required for the installation of doors.

1.02 WORK INCLUDED

A. Locks.

B. Exit devices.

C. Door closers.

D. Butt hinges.

E. Kickplates.

F. Stops and bumpers.

G. Flush bolts.

H. Thresholds and weather stripping

I. Final adjustments and checking.

J. Guarantee.

K. Hardware schedule.

L. Keying schedule.

1.03 REFERENCE STANDARDS

A. American National Standards Institute (ANSI):

1.	ADA	Americans with Disabilities Act - Public Law 101-336-July 1990
2.	ANSI A117.1	Building and Facilities - Providing Accessibility and Usability for Handicapped People
3.	ANSI A156.1	Butts and Hinges
4.	ANSI A 156.2	Bored and Preassembled Locks and Latches
5.	ANSI A156.1	Mortise Locks and Latches
6.	ANSI A156.15	Closer Holder Release Devices
7.	ANSI A156.18	Materials and Finishes

B. Steel Door Institute (SDI)

C. Door and Hardware Institute

1.04 SUBMITTALS

A. General
Submit shop drawings in accordance with Section 01300, Submittals.

B. Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance and lubrication of operating parts and finish, and other information necessary to show compliance with requirements.

C. Hardware schedule coordinated with doors, frames and related work to ensure proper size, thickness, hand, function, and finish of door hardware. Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item for each door or opening. Include the following information:
1. Type, style, function, size and finish of each hardware item.
2. Name and manufacturer of each item.
3. Fastenings and other pertinent information.
4. Location of each hardware set cross referenced to indications on drawings both on floor plans and in door and frame schedule.
5. Explanation of all abbreviations, symbols and codes contained in schedule.
6. Mounting locations for hardware.
7. Door and frame sizes and materials.
8. Keying information.

D. Submittal Sequence
Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.

E. Keying
1. Key locks in sets or subsets, master key and grand master key as directed by Owner and Engineer/Architect. After award of contract, hardware supplier shall confer with Owner and Engineer/Architect to determine keying system for approval. Furnish three (3) grand master keys. Master and grand master keys shall be delivered in a sealed container directly to the Engineer/Architect.
2. Tag each key and mark with item or plan door number.
3. Keys: Furnish three (3) change keys with each lock.

F. Templates for doors, frames and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.05 QUALITY ASSURANCE

A. Supplier Qualifications
A recognized door hardware supplier with 5 years experience with municipal facilities in the project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this project.

1. Require supplier to meet with Owner to finalize keying requirements and to obtain final instructions in writing.

1.06 DELIVERY, STORAGE AND HANDLING

A. Comply with Division 1 section "Materials and Equipment" and as follows:
1. Deliver keys to Owner by security shipment direct from hardware supplier.

1.07 MAINTENANCE

A. Maintenance Tools and Instructions
Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.01 FINISHES

A. Finish shall be as follows:
1. Lever Locks and Latches: US26D
2. Exit Devices: US26D
3. Kickplates: US32D
4. Door Closers: Sprayed aluminum.
5. Door Butts: US32D.
6. Door Stops and Holders: Stainless steel 32D.
7. Thresholds: Natural finish aluminum,
Weatherstripping: Keepers, clear anodized aluminum
8. Miscellaneous Items: US26D

2.02 LOCKS, LATCHES AND DEAD LOCKS

A. Acceptable manufacturers shall be Corbin Russwin.

B. Backset shall be 2¾-inch for all locks, latches and dead locks. Strikes shall be box type with wide enough lip projection to protect doorframe but not to exceed 3/16 inches beyond face of frame.

C. All locks and cylinders shall not have less than six pins.

2.03 EXIT DEVICES

A. Devices shall be as manufactured by Von Duprin as listed.

B. Function shall be as noted in schedule.

C. Provide glass bead kits where required.

2.04 BUTT HINGES

A. Ball bearing, non-rising loose pin, flat button tip.

B. Provide three butts per door (four for dutch doors).

C. Butt Size Requirements
1. 4-1/2" x 4-1/2", heavy weight.

D. Furnish UL approved butts on label doors.

2.05 DOOR CLOSERS

A. All door closers shall be as manufactured by LCN. Furnish special arms and applications as indicated in hardware schedule or as dictated by structural conditions or local code requirements.

B. Finish shall be sprayed aluminum.

2.06 KICKPLATES

A. As manufactured by Rockwood Manufacturing, or Hager.

B. All plates shall be 10" high, 16 gauge (.050), beveled sides and with countersunk screw holes at intervals of not over 6 inches on all four sides. Screws shall be stainless steel oval head, finish to match plates.

C. Kickplates all as noted in schedule.

2.07 STOPS, BUMPERS AND MISCELLANEOUS HARDWARE

A. As manufactured by Glynn-Johnson or Ives as listed in the hardware schedule.

2.08 THRESHOLDS AND WEATHERSTRIPPING

A. National Guard or Reese as listed.
1. Cope thresholds around mullions.

2.09 OVERHEAD RAIN DRIP

A. Material: Aluminum

B. 1/2-inch high x 1/4-inch deep.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Mount hardware units at heights indicated in following applicable publications, except if as specifically indicated or required to comply with governing regulations and except as otherwise directed by Engineer/Architect.
1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.

B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.

C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section "Joint Sealers."

F. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated. Install hinge side weather stripping on interior face of door to bear snugly against stop. Install head weatherstripping before mounting closer.

3.02 ADJUSTING, CLEANING, AND DEMONSTRATING

A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
   1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

B. Clean adjacent surfaces soiled by hardware installation.

3.03 HARDWARE SCHEDULE

A. General

Provide hardware for each door to comply with requirements of Section "Door Hardware," hardware set numbers indicated in door schedule, and in the following schedule of hardware sets.
   1. Hardware sets indicate quantity, item, manufacturer and product designation, size, and finish or color, as applicable.

B. Hardware Sets
   1. Hardware Set No. 1

1-1/2 pair Butts	Hager BB1199 NRP – 4 1/2 x 4-1/2
Lockset	CL3351 NZD
Closer with Restraint	4010 or 4110
Wall Stop	Ives WS407
Kickplate	3411

	Weatherstripping-Jambs	Reese 770A
	Weatherstripping—Head	Reese 775A
	Threshold	Reese S282A
	Sill Strip	Reese DB595A
2.	Hardware Set No. 2	
	3 pair Butts	Hager BB1199 NRP – 4-1/2 x 4-1/2
	Lockset	CL3351 NZD
	Closer with Restraint	4110 H CUSH
	(2) Kickplate	3411
	Weatherstripping--Jambs	Reese 770A
	Weatherstripping--Head	Reese 775A
	Threshold	Reese S282A
	Sill Strip	Reese DB595A
	Overhead Stop / Holder	Glynn-Johnson 90H
	Astragal	Reese 103C
	2 Surface Bolts (inactive leaf)	Glynn-Johnson 1641 x 1642
3.	Hardware Set No. 3	
	1 1/2 pair Butts	Hager 1199 - 4-1/2 x 4-1/2
	Lockset	CL3351 NZD
	Wall Bumper	Glynn Johnson 50W
4.	Hardware Set No. 4	
	1 1/2 pair Butts	Hager BB1199 NRP 4-1/2 x 4-1/2
	Panic Hardware	Von Duprin Series 99NL with exterior latch
	Lockset	Rim Cylinder
	Kickplate	3411
	Weatherstripping	Reese 770A
	Threshold	Reese S282A
	Sill Strip	Reese DB595A
	Closer with Restraint	4110 Cush
5.	Hardware Set No. 5	
	1-1/2 pair Butts	Hager 1199 – 4 1/2 x 4-1/2
	Lockset	CL3320 NZD
	Closer	4010
	Wall Stop	Ives WS407
	Kickplate	3411
	Weatherstripping-Jambs	Reese 770A
	Weatherstripping—Head	Reese 775A
	Threshold	Reese S282A
	Sill Strip	Reese DB595A

- END OF SECTION -

SECTION 08810

GLASS AND GLAZING

PART 1 - GENERAL

1.01 DESCRIPTION

A. The items under this division include:
   1. Glass of type indicated for all openings to receive glass.
   2. Installation of all glass or similar material set in windows, doors of similar vision or illumination openings.

1.02 QUALITY ASSURANCE

A. Window and sheet glass shall conform to the requirements of Federal Specifications DD-G-451c. Glass shall be new stock and carry the manufacturer's label showing manufacturer's name and quality of material. Defects such as bubbles, blisters, specks, cords, and strings shall not extend toward the center of a sheet of glass more than ½ inch from the edge.

B. Glazing compound for window and sheet glass in sizes up to 100 united inches shall be an oleo-resinous, mastic meeting the requirements of Federal Specification TT-G 0041 Oc, and of Revision No. 3 of the Aluminum Window Manufacturers' Association.

C. Window and sheet glass in sizes over 100 united inches, the compound shall be a polysulfide base material conforming to the requirements of the American Standard Specifications ANSI-A 116.1.

PART 2 - PRODUCTS

2.01 WINDOWS

A. Unless otherwise called for, all windows shall have double strength, quality "A"(D. S.A.) glass for openings up to 10 sq. ft., 1/8-inch glass for openings up to 12 square feet, and 3/16-inch glass for openings up to 27 square feet. For larger openings, the Contractor shall furnish glass of thickness recommended by the manufacturer for an 80 M.P.H. wind for any particular opening.

B. No double strength glass shall be less than 0. 115-inches thick.

2.02 DOORS

A. Unless otherwise called for, all doors shall have 1/8-inch glass, quality "A" for openings up to 5 square feet, 3/16-inch glass quality "A" for openings up to 12 square feet, and ¼-inch polished plate glass openings up to 18 square feet.

2.03 INSULATED WINDOWS

A. Unless otherwise called for insulated windows shall have insulating glass panels consisting of two sheets of D.S.A. glass separated by a one-half inch air space, dehydrated and hermetically sealed at the factory, minimum glass thickness to be ¼-inch.

B. Insulated glass shall carry the manufacturer's five-year warranty on seal construction.

PART 3 - EXECUTION

3.01 INSTALLATION

A. After all installation work, and after any final stain and varnish where required in the vicinity of any glass or panels, the glass and panels shall be cleaned inside and outside and be free of all compound, dirt, and stain.. Any cracked, broken or missing glass or panels shall be replaced before final acceptance of the project by the Owner.

- END OF SECTION -

9

DIVISION 9

FINISHES

SECTION 09250

GYPSUM BOARD

PART 1 - GENERAL

1.01 SUMMARY

A. Work included: This section provides gypsum wallboard, accessories, and texture finish.

B. Related Sections and Divisions:
   1. Applicable provisions of the General Conditions shall govern work in this section.
   2. Section 01300, Submittals

1.02 REFERENCES

A. ASTM C36 - Gypsum Wallboard.

B. ASTM C475 - Joint Treatment Materials for Gypsum Wallboard Construction.

C. ASTM C630 - Water Resistant Gypsum Backing Board.

D. ASTM C840 - Application and Finishing of Gypsum Board.

E. ASTM El 19 - Fire Tests of Building Construction and Materials.

1.03 REGULATORY REQUIREMENTS

A. Conform to Wisconsin Commercial Building Code for fire rated assemblies.

1.04 ENVIRONMENTAL CONDITIONS

A. Establish and maintain environmental conditions for application and finishing gypsum board to comply with ASTM C840 and with gypsum board manufacturer's recommendations.

B. For non-adhesive attachment of gypsum board to framing, maintain not less than 40'F. For adhesive attachment and finishing of gypsum board maintain temperature uniformly within the range of 55°F to 70°F for 48 hours prior to application and continuously thereafter until drying is complete.

C. Ventilate building spaces to remove moisture not required for drying joint treatment materials. Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Acceptable manufacturers shall be United States Gypsum Company (USG) or equal.

2.02 MATERIALS

A. Gypsum Wallboard:
   1. Provide gypsum board conforming to ASTM C36, in maximum lengths available to minimize end to end joints.
   2. Gypsum shall be 5/8-inch thick on bottom of joists and ½ inch thick on walls by 48 inches wide.
   3. Provide 5/8-inch moisture resistant gypsum wallboard conforming to ASTM C630 on the walls in the restrooms, locker rooms, and laboratories. Wallboard shall be USG WR.
   4. Gypsum board for fire rated walls shall be 5/8-inch USG Firecode C Core gypsum panels, or equal.
   5. Provide 5/8-inch thick abuse-resistant panels and walls in garages and store rooms.

B. Accessories:
   1. Provide materials complying with ASTM C475, ASTM C840, and recommendations of manufacturer of both gypsum board and joint treatment materials for the application indicated.
   2. Reinforcement at exterior corners shall be USG Galvanized Dura-Bead No. 101, or equal.
   3. Reinforcement at internal corners shall be USG No. 100 Perf-a-Tape, or equal.
   4. Provide trim accessories as required.
   5. Provide No. 200 case beads and other accessories as detailed or required.
   6. Joint compound shall be USG Durabond 90, or equal, at cased edge joints.
   7. Furring channels shall be 7/8-inch metal, hat shaped.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrate to receive gypsum wallboard systems for alignment, support, bracing, prior to installation. Shim, block as required to comply with tolerances.

B. Verify that the installation of all blocking, mechanical, and electrical work is completed.

3.02 INSTALLATION

A. Install and finish gypsum board to comply with ASTM C840.

B. Direct Attachment:
   1. All ends and edges of sheetrock shall occur over nailing members, except when joints are at right angles to framing members.
   2. All wallboards shall be applied horizontally. All ends and edges shall fit neatly. End joints shall be staggered. Joints on opposite sides of a partition shall be arranged to occur on different studs.
   3. Sheetrock shall be applied to studs by power-driven 1-1/4 inch Type W screws, spacing not to exceed 12 inches on center. Fasteners shall be at least 3/8-inch from edges.

C. Direct Furring Channel Attachment:

1. Apply gypsum panels horizontally (right angles to framing). Use maximum practical lengths to minimize end joints. Fit ends and edges closely, but not forced together. Stagger end joints in successive courses. When necessary, cut ends, edges and cutouts within the field of the panel in a workmanlike manner.
2. Drive fasteners in field of panel first, working towards ends and edges. Hold panel in firm contact with framing while driving fasteners. Space perimeter fasteners at least 3/8-inch from ends and edges.
3. Attach gypsum panels to framing supports by power-driven USG brand screws, Gold Bond 1-1/4 inch Type A drywall screws, or equal, spaced 12 inches on center maximum.

D. Cut openings required for ducts, piping, etc., above ceiling plane or fit panels after installation.

E. Provide edge trim at all exposed edges of board and where board abuts dissimilar material. No raw drywall shall abut another material without a bead.

F. Treat cut edges and holes in moisture resistant gypsum board with sealant.

G. Provide control joints at locations indicated, or if not indicated at spacings and locations required by referenced gypsum board application and finish standard to prevent cracking of finished drywall.

H. Patch all existing areas that are modified or damaged.
1. Gypsum board on fire rated walls shall be installed in accordance with U.L. listings.

3.03 JOINT TREATMENT

A. Finish all exposed to view surfaces.

B. Reinforce and trim all joints, vertical and horizontal corners, and exposed edges.

C. Fill with finishing compound all joints, fastener heads, trim accessory flanges, and other depressions in the surface of the wallboard to obtain a smooth flush surface.

D. Pre-fill all V-grooved SW board. Butter all joints. Embed tape and apply skim coat of joint compound.

E. Do not use topping compound for embedding tape.

F. Do not intermix joint compounds.

G. Spot fastener heads and fill beads and trim.

H. Apply second and third coats.

I. Allow drying time between application of joint compound in accordance with manufacturer's recommendations for the relative humidity and temperature levels at the time of application. In no case, allow less than 24 hours drying time between applications of joint compound.

J. Lightly sand joint compound and smooth between coat applications.

K. Apply not less than three separate coats of joint compound over joints, fastener heads, and metal flanges on surfaces exposed to view.

L. Where not exposed to view within building, embed tape at joints and skim coat with joint compound.

M. Finishing work will not be considered acceptable if corners of edges do not form true, level, straight, or plumb lines, or if joints, fasteners, head, flanges of trim accessories, or defects are visible after application of field-applied decoration.

- END OF SECTION -

SECTION 09310

CERAMIC TILE

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Ceramic tile flooring and base installed using thin bed application method, cementitious, grouted joints and sealing grout.

B. RELATED SECTIONS AND DIVISIONS

1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals.

1.02 REFERENCES

A. American National Standards Institute (ANSI):

1.	ANSI A108.1-1985	Installation of Ceramic Tile with Portland Cement Mortar.
2.	ANSI A108.5-1985	Installation of Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex-Portland CementMortar.
3.	ANSI A 108.10-1985	Installation of Grout in Tilework.
4.	ANSI Al 18.1-1985	Dry-Set Portland Cement Mortar.
5.	ANSI Al 18.4-1985	Latex-Portland Cement Mortar.
6.	ANSI Al 18.6-1985	Ceramic Tile Grouts.
7.	ANSI A137.1-1980	Ceramic Tile

1.03 SUBMITTALS

A. Submit grout manufacturer's recommendations for cleaning.

B. Sample tiles.

1.04 QUALITY ASSURANCE

A. Comply with ANSI A137.1 for ceramic tile materials.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Tile

1. American Olean Tile Co.
2. Dal-Tile Corp.
3. Mid-State Tile
4. Summitville Tiles, Inc.
5. United States Ceramic Tile Co.

B. Mortar and Grout

1. American Olean Tile Co.
2. C-Cure Chemical Co., Inc.
3. L&M Mfg. Inc.
4. Southern Grouts & Mortars, Inc.
5. Summitville Tiles, Inc.

2.02 TILE MATERIALS

A. Ceramic Mosaic Floor Tile
Unglazed finish; naturally clay, plain face factory mounted, flat tile with smooth, non-abrasive wearing surface and cushioned edges; standard grade; nominal 2 x 2 inches by 1/4inch thickness.

B. Ceramic Trim Units
Same color and finish as adjoining floor, wall tile; size and coursing coordinated with adjoining floor tile; shapes as follows:

2.03 THIN BED MATERIALS

A. Bond Coat
Latex-portland cement mortar complying with ANSI Al 18.4.

2.04 GROUT MATERIALS

A. Grout
Cementitious type with latex additive complying with ANSI A 118.6; grey color, pre-mixed.

B. Grout Sealer
Clear, surface penetrating, silicone resins in hydrocarbon solvents; specifically designed to seal cementitious grout joints against water penetration and staining.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install reinforcing wire fabric and cleavage membrane.

B. Install ceramic floor and trim units in accordance with ANSI 108. 1.

C. Lay tile in grid pattern. Ensure pattern is uninterrupted through openings.

D. Form comers and bases neatly. Align wall and base and floor joints.

E. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size.

F. Sound tile after setting. Replace hollow sounding units.

G. Allow tile to set for a minimum of 48 hours prior to grouting.

H. Grout ceramic tile in accordance with ANSI 108. 10.

I. Ensure joints are watertight, without voids, cracks, excess mortar or grout.

J. Keep control joints free of mortar or grout.

K. Thoroughly clean tile surfaces after grouting, in accordance with grout manufacturer's recommendations for cleaning.

L. Apply grout sealer to grout joints in accordance with manufacturer's application instructions.

3.02 PROTECTION

A. Protect installed tile work with kraft paper or other heavy covering to prevent staining, damage and wear during subsequent construction operations.

B. Prohibit traffic from floor finish for seven days after installation.

- END OF SECTION -

SECTION 09800

PAINTING AND SPECIAL COATINGS

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes the methods and materials to be used for all exterior and interior painting work.

1.02 QUALITY ASSURANCE

A. Materials shall be used in conformance with the instruction of the manufacturer or supplier.

B. Where painting materials will come in contact with potable water, manufacturer shall provide current written acceptance for their coating system from the state's governing authority.

1.03 SUBMITTALS

A. Submit the following data in accordance with Section 01300, submittals including:
   1. Name of contractor or subcontractor who will perform painting, coating or surface preparation work.
   2. Name of manufacturer of coating materials together with a list of materials to be used and the mil thickness to be applied.
      a. Material list shall give brand name and generic type.
      b. Material list shall identify primer required.
   3. Supply two copies of color chart for Owner's selection.

1.04 JOB CONDITIONS

A. Environmental Requirements.
   1. Temperature.
      a. Follow manufacturer's instructions for system being applied.
   2. Atmospheric conditions.
      a. Paint shall not be applied to wet or damp surfaces.
      b. Paint shall not be applied during rain, snow, fog, or mist.
      c. Paint shall not be applied when relative humidity exceeds 85 percent or if relative humidity is expected to exceed 85 percent within 18 hours after application of paint.
      d. Dew or moisture conditions should be anticipated and if such conditions are prevalent, exterior painting shall be delayed until conditions are dry.
      e. Exterior painting should be completed well in advance of probable time of day condensation will occur, in order to permit the film an appreciable drying time prior to formation of moisture.
   3. All piping, equipment, structures, and appurtenances shall be coated prior to being placed into service.

PART 2 - PRODUCT

2.01 ACCEPTABLE MANUFACTURERS

A. Wasser, PPG, Sherwin Williams, Devoe Coatings, International Coatings, or equal. All moisture-cured urethanes shall be Wasser.

2.02 PAINTING SYSTEMS

Table 1
Coating Systems For Application On Concrete And Concrete Block

System Type	Application	Generic Type	Finish Coat	Primer Coat	Min Dry mil Thickness	Surface Preparation
C-1	Concrete Concrete Block, in Corrosive Environments	Polyamide Epoxy	Polyamide Epoxy (Color as Selected by Owner)	Concrete: Self-priming Block: Polyamide Primer	6-8 mils DFT per coat	Concrete: Allow new concrete to cure for 28 days. Prepare surface per Section 03300 and per manufacturers instructions. Temperature must be 50° and rising unless an approved accelerator is added. Block: Allow mortar to cure for 28 days. Level protrusions and splatter. All surfaces must be clean and dry. Concrete surface must be cured 28 days. Moisture content at the surface shall be less than 5 %.
C-2	Concrete Floors	Polyamide Epoxy	Polyamide Epoxy (Color as Selected by Owner)	Polyamide Epoxy (Color as Selected by Owner) Thinned per manufacturer's instructions	6-8 mils DFT per coat	Concrete: Allow new concrete to cure for 28 days. Prepare surface per Section 03300 and per manufacturer's instructions. All surfaces must be clean and dry. Concrete surface must be cured 28 days. Moisture content at the surface shall be less than 5 %.

System Type	Application	Generic Type	Finish Coat	Primer Coat	Min Dry mil Thickness	Surface Preparation
C-3	Interior Concrete Walls, Ceilings, and Concrete Block	Latex	Vinyl Acrylic Latex (Eggshell) Color as selected by owner.	Concrete and Concrete Block: Latex Block Filler	Concrete and Block: Block filler plus two finish coats. 150 sq. ft./gal primer coat 200 sq. ft./gal finish coats	Concrete: Allow new concrete to cure for 28 days. Brush-off blast. Block: Allow mortar to cure for 28 days. Level protrusions and splatter. All surfaces must be clean and dry.
C-4	Exterior Concrete & Masonry	100% Acrylic Elastomeric	100% Acrylic Elastomeric	Acrylic Latex Alkali Resistant Primer	2 mils primer 7 mils per coat. 2 coats 16 total	Follow manufacturer's instructions
C-5	All Exposed, Nonsubmerged, Unpainted, Exterior Masonry Surfaces	Concrete Block and Brick: Silane based sealer.	NA	NA	NA	Note: Apply two coats per manufacturer recommendations
C-6	Below grade exterior building walls	Cold-applied tar damp-proofing	W.R. Meadows Sealmastic Brush or Spray-on	NA	NA	Concrete surface shall be clean & free of all loose material.
C-7	Concrete, submerged to 6 inches above high water line	Polyamide Epoxy	Polyamide Epoxy	Concrete: self priming	6 primer 6 finish 12 total	Concrete: Allow new concrete to cure for 28 days. Brush-off blast. Apply per manufacturer's instructions.
C-8	Concrete, chemical containment areas	Polyamide Epoxy	Polyamide Epoxy	Concrete: self priming	6 primer 6 finish 12 total	Concrete: Allow new concrete to cure for 28 days. Brush-off blast. Apply per manufacturer's instructions.

Table 2
Coating Systems For Application On Metal And Plastic

System Type	Application	Generic Type	Finish Coat	Primer Coat	Min Dry mil Thickness Per Coat	Surface Preparation
M-1	Non-Submerged Indoors and Outdoors	Polyamide Epoxy and Urethane (exterior only)	(Color as Selected by Owner) Interior: One coat Epoxy Exterior: One coat Urethane	 One coat Epoxy One coat Epoxy	 5 primer 5 finish 10 total 5 primer (epoxy) 3 finish (urethane) 8 total	Steel SSPC-SP6
M-2	Submerged or Intermittently Submerged (Except potable water).	Polyamide Epoxy	Polyamide Epoxy	Polyamide Epoxy	4 Primer 6 Intermediate 6 Finish 16 total	Steel immersion. Service: SSPC-SP10
M-3	Electrolytic Protection for Aluminum	Polyamide Epoxy	Polyamide Epoxy	Polyamide Epoxy	6 Mils	SSPC-SP1 Solvent Cleaning

Table 3
Coating System For Application On Piping Systems

System Type	Application	Generic Type	Finish Coat	Primer Coat	Min Dry mil Thickness Per Coat	Surface Preparation
P-1	Non Submerged Iron Steel & Plastic	Polyamide Epoxy	One Coat Epoxy Color as selected by Owner.	One Coat Epoxy	6 primer 6 finish 12 Total	Iron & Steel: SSPC – SP6 Factory apply universal primer verify compatibility with epoxy finishes Plastic: Solvent Clean all surfaces
P-2	Submerged Iron, Steel	Polyamide Epoxy	One Coat Epoxy	One Coat	4 primer 6 intermediate 6 finish 16 Total	SSPC-SP10
P-3	Non-submerged Iron & Steel Insulated Exposed	Polyamide & Acrylic Latex	Acrylic Latex Color as selected by Owner.	Polyamide Epoxy	1 primer on piping 2 finish coats on insulation	All surfaces shall be clean & dry.

Table 4
Coating Systems For Application On Wood and Gypsum Wallboard

System Type	Application	Generic Type	Finish Coat	Primer Coat	Min Dry mil Thickness Per Coat	Surface Preparation
A-1	Interior Plaster or Drywall Surface	Latex	2nd Coat: Satin, Latex enamel 3rd Coat: Satin, Latex enamel "orange peel" finish.	1st Coat: Vinyl latex Primer sealer.	--	Dry, Sanded
A-2	Exterior Stained Wood	Alkyd	2nd Coat: Alkyd base semi-transparent or solid stain (Selection by Owner)	1st Coat: Alkyd base semi-transparent or solid stain.	--	Dry, Sanded
A-3	Interior Stained Wood	Polyurethane	*3rd Coat: Satin, polyurethane varnish finish *4th Coat: Satin, polyurethane varnish finish *sand between coats	1st Coat: Oil-Based Wood stain 2nd Coat: Satin, polyurethane varnish finish	--	Fill open grained wood with paste wood filler tinted to shade of wood stain prior to staining.
A-4	Interior Painted Wood	Latex	2nd Coat: Semi-gloss Latex enamel 3rd Coat: Semi-gloss Latex enamel	1st coat: Alkyd enamel undercoater	--	Dry, Sanded

PART 3 – EXECUTION

3.01 COLOR CODING AND LABELING OF PIPING AND EQUIPMENT

A. Color Coding

1. Primer color shall be at least two shades lighter in color than the finish to facilitate adequate inspection of field application.
2. The following color code shall be applied for all piping exposed to view in all installations.

Aeration Air	OSHA Safety Green
Acid Drain and Vent	International Orange
Chemical Solutions	OHSA Safety Orange
Chlorine Solution & Vacuum	OSHA Safety Yellow
CONCENTRATED SLUDGE	BROWN
Potable Water	Blue
Digested Sludge	Brown
Equipment Drain	Gray
ENGINE EXHAUST	NOT COATED
Equipment Vent	Gray
Fuel Supply &Return	Black
Grit	Gray
Hot Water & Tempered Water	Blue
Instrument Air	OSHA Safety Green
Mixed Liquor	Brown
Nonpotable Water	Blue with 6-inch wide red bands at 30 inch on center
LIQUIFIED PROPANE GAS	ORANGE
Pumped Drainage	Gray
Polymer	Light Green
Pumped Sanitary Drainage	Gray
Return Activated Sludge	Brown
Raw Sewage	Gray
Roof Drain	Gray
Service Air	OSHA Safety Green
Sanitary Drain & Vent	Gray
Secondary Effluent	Light Gray
Sample	Gray
Supermatant	Brown
Sulfur Dioxide Solution & Vacuum	OSHA Safety Red
Secondary Sludge & Scum	Brown
Tank Drain	Gray
Waste Activated Sludge	Brown

B. Pipeline Identification

1. The Contractor shall furnish and apply pipeline identification labels, complete, as required by this section for new lines shown on piping drawings. Refer to related documents for symbols and label identification.
2. Size of Markers:
   a. Markers for 3-inch OD and larger pipe (including insulation) shall be 2-inch standard label, self-sticking with numbers and letters as called for herein.

b. Markers for pipe under 3-inch OD (including insulation) shall be 1-inch standard label, self-sticking with numbers and letters as called for herein.

3. Application of Pipe Markers:
   a. Apply marker at main valves to show proper identification of pipe contents.
   b. Use an arrow marker with each pipe content marker. The arrow shall always point away from the pipe marker and in the direction of flow. If flow can be in both directions, use a double-headed arrow marker.
   c. Apply marker and arrow marker at every point of pipe entry or exit where pipe goes through wall if visible.
   d. Identify long continuous lines with pipe and arrow marker approximately every 30 feet.
   e. On horizontal pipe apply markers on the two lower quarters of the pipe where view is unobstructed. In this position, markers are read at a glance from floor level; and dust will not obscure the marker.
   f. Apply pipe marker and arrow marker on each riser and "T" joint.
   g. Provide a minimum of two markers per room, crawl space, or compartment.
4. References:
   a. Brady Self-Sticking Industrial Products Catalogue, or as approved, conforming to ANSI A13.1 "Identification of Pipe Systems."
5. Identification Code Tabulation:
   a. Yellow background with black letters for ANSI classified inherently hazardous materials: flammable, explosive, chemically active or toxic, extreme temperature or pressure, or radioactive.
   b. Green background with white letters for ANSI classified inherently low hazard liquid or liquid admixture materials.
   c. Blue background with white letters for ANSI classified inherently low hazard gas or gaseous admixture materials.
   d. Red background with white letters for ANSI classified fire quenching materials such as water (for fire fighting), foam, C02, halon, etc.

C. Unloading Station Signs
   1. Contractor shall install double sided permanent steel signs and supports at the truck unloading station(s).

3.02 PROTECTION OF FINISHED WORK AND EQUIPMENT

A. Protect with tarpaulin or drop cloth all floors, walls, glass, finished painted work and equipment from paint spatter or other damage that might result from this work.

B. Promptly remove all oil, paint and solvent waste rags from the site and legally dispose of them. Do not bum waste materials.

C. Paint, varnish, and mixing cans shall not be placed on bare floors.

D. Dirty, oily, and dusty covers shall not be used.

E. No stains or spots shall remain after completion of painting.

F. Remove hardware accessories, light fixtures, and similar items before painting.
   1. Replace above items after finish coat is applied.

2. Masking may be utilized in lieu of removal of items.

3.03 APPLICATION

A. Application may be by spraying, brushing, or rolling.
   1. Method used shall be one as approved by material manufacturer for any one particular product.
   2. Notify Engineer/Architect before proceeding as to method to be employed.
   3. Spraying:
      a. Care shall be taken that nozzles are as recommended by supplier for product being applied.
      b. Air pressure recommended by product supplier shall be maintained.
   4. Brushing:
      a. Brush in one direction then smooth at right angles to original brushing to produce a uniform thickness of coating.
   5. Thickness of Coating:
      a. Where number of coats are indicated, it is intended to show the normal practice to obtain the proper dry mil thickness.
      b. The dry mil film thickness shall be provided in all cases even though it may require more or less coatings than specified. Coating shall be applied in accordance with manufacturer's recommendations.

B. Spray Painting Out of Doors
   1. Care should be taken that no spray falls on nearby structures.
   2. Spraying on exterior surfaces shall be confined to quiet days when it will not affect adjacent property.
   3. Contractor shall be responsible for any and all damage resulting from drifting spray.

C. Ventilation when painting interior surfaces of tanks, pits, vaults or other enclosures.
   1. Contractor must provide adequate ventilation at all times.
   2. Ventilation shall be adequate to remove fumes, preventing injury to workmen, or possibility of accumulating volatile gases.

3.04 PAINTING SCHEDULES

A. Painting and coating work shall be performed in accordance with this specification and the finish schedules shown on the drawings.
   1. The following surfaces shall not be coated unless color coding is required by codes.
      a. Stainless Steel.
      b. Aluminum.
      c. Shop finished enameled surfaces.
      d. Galvanized steel (unless otherwise specified). Use galvanized steel primer if required to paint.

- END OF SECTION -

10

DIVISION 10

SPECIALTIES

SECTION 10200

LOUVERS AND VENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section includes furnishing and installing louvers in accordance with the plans and specifications.

B. Related Sections and Divisions:
1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Section 3500, Metal Fabrications.
4. Section 07600, Flashing and Sheet Metal.
5. Section 07920, Joint Sealers.
6. Section 15890, Ductwork.
7. Section 15910, Ductwork Accessories.

1.02 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300, Submittals including:
1. Dimensions, capacities, materials of construction, weights, and appropriate identification for all equipment in this Section.
2. Manufacturer standard color chars for the specified finish.,

1.03 REFERENCE STANDARDS

NFPA 90A - Standard for Installation of Air Conditioning and Ventilating Systems.
SMACNA - HVAC Duct Construction Standards - Metal and Flexible, First Edition, 1985.
AMCA Publication 511.

PART 2 - PRODUCTS

2.01 WEATHERPROOF LOUVERS

A. American Warming, Cesco, Dowco, Industrial Louvers, Inc., Louvers & Dampers, Inc., Ruskin, Shipman Industries and Vent Products.

B. Furnish louvers with .081" extruded aluminum alloy blades, frame and supports, horizontal "J" style drainable blades with maximum of 4'-0" unsupported length in a fixed 6" core, 6" minimum blade depth, 3-1/2" blade spacing and 35 deg. blade angle and mullions invisible from exterior face.

C. Furnish louvers with channel type frame for installation in new construction and flange type frame for installation in existing construction with 1/2" mesh .063" aluminum bird screen in extruded U frame mounted behind blades. All screws, bolts, hardware, etc., shall be stainless steel.

D. Units to have Kynar 500 finish of color as selected by the Owner. Finish shall have a 20-year warranty.

PART 3 - EXECUTION

3.01 WEATHERPROOF LOUVERS

A. Before installation of louver, coat dissimilar surfaces, which will be in contact with aluminum with a heavy coating of bituminous paint. No bituminous paint will be permitted to be exposed to view.

B. Connect outside air intake duct to the louver, sealing all connections air and water tight.

C. Install louvers and sills plumb in the openings. Anchor louvers using stainless steel anchors.

- END OF SECTION -

SECTION 10441

SIGNS AND PLAQUES

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Provide plastic and metal signs as indicated.

B. Related Sections and Divisions: Applicable provisions of the General Conditions shall govern work in this section.

1.02 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300, Submittals including:
   1. Indicate sign styles.
   2. Lettering font.
   3. Foreground and background colors.
   4. Locations.
   5. Overall dimensions of each sign.

PART 2 - PRODUCTS

2.01 CAUTION AND DANGER SIGNS

A. Provide CAUTION and DANGER signs as listed on schedule.

B. CAUTION signs shall be fiberglass with black letters on yellow background, Brady Systems, B-120, or equal.

C. DANGER Signs shall be fiberglass with black letters and red and white Danger logo, Brady Systems, B-120, or equal.

D. Sign sizes shall be as follows:
   1. A: 14-inch x 20-inch
   2. B: 10-inch x 14-inch
   3. C: 7-inch x 10-inch
   4. D: 3-inch x 5-inch

E. Sign types shall be as follows:

TYPE	MESSAGE	
VII	"DANGER"	Chlorine Room—Poisonous Gas

2.02 ROOM SIGNS

A. Room signs shall be, W. H. Brady Co., B-909, or equal. Owner shall select Color.

B. Sign shall incorporate handicap accessible symbol where applicable.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Caution and Danger Signs.
   1. Install signs after surfaces are finished, in locations as directed by the Engineer.
   2. Install signs in accordance with this specification and with manufacturer's instructions.
      a. Interior clean, dry, flat surfaces: Mount signs using double coated foam tape.
      b. Interior and exterior concrete and masonry surfaces: Mount signs using plastic anchors and stainless steel screws at each corner of sign. Provide plastic spacers on uneven surfaces so that sign is level and plumb.
      c. Exterior metal surfaces: Mount signs using stainless steel self-tapping screws, one at each corner of sign.
      d. Yard hydrants: Mount signs on aluminum, channel posts having 1/4-inch aluminum plates, same size as sign. Set post 4 feet into ground, embedded in 8-inch diameter concrete base.

B. Room Signs
   1. Provide room signs for all areas as shown on the drawings.
   2. Install signs as directed by the Engineer.

3.02 SCHEDULES

A. CAUTION and DANGER signs
   1. Provide CAUTION signs as follows:

TYPE	SIZE	LOCATION	QUANTITY
VII	A	Chemical Rooms	1

- END OF SECTION -

SECTION 10522

FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Provide fire extinguishers, cabinets and accessories as shown on the drawings.

B. Related Sections and Divisions: Applicable provisions of the General Conditions shall govern work in this section.

1.02 REFERENCES

A. ANSI/NFPA 10 - Portable Fire Extinguishers.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300, Submittals including:
   1. Extinguisher operational features,
   2. Color and finish,
   3. Anchorage details and cabinet dimensions.

1.04 QUALITY ASSURANCE

A. Provide units conforming to NFPA 10 requirements for portable fire extinguishers.

B. Provide fire extinguisher, cabinets, and accessories by single manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Ansul Sentry SY Series, Product MP Series.

2.02 EXTINGUISHERS

A. Provide dry chemical type, Larsen's MP Series, 10 pound capacity fire extinguishers. Fire extinguishers shall be UL approved for Class A, Class B and Class C fires.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Place extinguishers in brackets as instructed by owner.

C. The fire extinguishers shall be provided in the following locations:
   1. Pump Room.
   2. MCC Room.
   3. Engineer Generator Room.

- END OF SECTION -

SECTION 10800

TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:
   1. Toilet, bath, shower, and washroom accessories as shown on the drawings.
   2. Grab bars.
   3. Attachment hardware.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 REFERENCES

A. ANSI A117.1 - Safety Standards for the Handicapped.

B. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

C. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

D. ASTM A269 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

E. ASTM A366 - Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.

F. ASTM B456 - Electro-deposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

1.03 REGULATORY REQUIREMENTS

A. Conform to ANSI Al 17.1 and Federal ADA-AG code for access for the handicapped.

PART 2 - PRODUCTS

2.01 TOILET TISSUE DISPENSERS

A. Multi-roll dispenser shall be surface-mounted Bobrick B-288, Bradley 5402, or equal.

B. Unit shall be Type 304 stainless steel with satin finish.

2.02 HOOKS

A. Provide two (2) heavy-duty hooks shall be Bobrick B-2116, Bradley Model 911, or equal.

B. Hook and flange shall be brass castings with satin nickel-plated finish.

C. Locations by Owner.

2.03 SOAP DISPENSER

A. Provide surface-mounted liquid soap dispensers, Bobrick B-86, Bradley 657, or equal.

B. Unit shall be chrome-plated brass with plastic container.

C. Install one above each toilet room sink.

2.04 TOWEL DISPENSERS

A. Receptacle shall be Bobrick B-369 or equal.

B. Dispenser capacity shall be, 400 single fold towel dispensers shall be Bobrick Bradley 251-15 or equal.

C. Unit shall have Type 304 stainless steel with satin finish.

D. Locate near toilet room sink.

2.05 MIRRORS

A. Mirror shall be shelfless mirrors, 18 inches by 30 inches high. Bobrick B-1556-1830 or equal.

B. Mirrors shall be Type 430 stainless steel finish.

2.06 SHOWER CURTAIN AND ROD

A. Shower curtain rod shall be 1¼-inch diameter, 18 BW gauge, 304 satin finish stainless steel shower curtain rod, Bradley Model 9531, or equal.

B. Flanges shall be 3-inch diameter satin finish stainless steel. Provide 12 chrome plate brass curtain hooks for each curtain.

C. Provide one heavy-duty rubberized cloth shower curtain.

2.07 GRAB BARS

A. Provide two (2) sets of stainless steel, peen grip with satin finish, 1¼-inch diameter grab bars. Bars shall be concealed mounted type, Bobrick B-5806 or equal.

B. See drawings for configuration of grab bars.

2.08 KEYING

A. Supply two keys for each accessory to Owner.

B. Key all accessories alike.

2.09 VANITY

A. Vanity top with backsplash shall be of laminate construction.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions, ANSI Al 17.1, Federal ADA-AG, and Wisconsin Commercial Building Code.

B. Install plumb and level, securely and rigidly anchored to substrate.

- END OF SECTION -

11

DIVISION 11

EQUIPMENT

SECTION 11000

EQUIPMENT, INSTALLATION, TRAINING AND RECEIPT FOR SPARE PARTS CHECKLISTS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section includes completing the installation and training checklists.

B. Related Sections and Divisions.
   1. Applicable provisions of the General Conditions shall govern the work in this section.
   2. All related equipment specifications.
   3. Section 01300, Submittals.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.01 CHECKLISTS

A. Contractor shall complete the Equipment Installation Checklist. Checklist shall be completed and submitted to the Engineer after installation.

B. Contractor shall complete the Equipment Training Checklist. Checklist shall be completed and submitted to the Engineer after each day of training is completed.

C. Contractor shall complete the receipt for Spare Parts/Equipment Checklist and submit to the Engineer.

- END OF SECTION -

Robert E. Lee & Associates, Inc.
Job Number 4931-001

Equipment Installation Checklist

Project PUETZ ROAD BOOSTER STATION

Equipment_____

Specification Section_____

I hereby certify the equipment supplier/manufacturer has inspected this equipment and that it has been properly installed, adjusted and calibrated. I further certify that this equipment may now be operated for test purposes and/or normal use.

Manufacturer's Representative

Signature_____ Date_____

Name (print)_____

Representing_____

Contractor

Signature_____ Date_____

Name (print)_____

Representing_____

Vendor Days Used____

Warranty Commencement Date: *(check one)*

☐ Substantial Completion Date as Stated in Certificate

☐ Other Date_____
(Only to be used if after the substantial completion date, unless partial utilization or substantial completion is authorized.)

This form shall be completed and submitted to ENGINEER prior to training of OWNER's personnel.

The ENGINEER verifies the above "Vendor Days Used" and "Warranty Commencement Date".

Signature_____ Date_____

Representing_____

Attach equipment testing report including any vendor reports

Robert E. Lee & Associates, Inc.

Job Number 4931-001

Equipment Training Checklist

Project PUETZ ROAD BOOSTER STATION

Equipment_____

Specification Section_____

Critical Maintenance Training

I hereby certify that the equipment supplier/manufacturer has instructed OWNER's personnel in the start-up of this equipment and all critical maintenance necessary to operate equipment until post startup training.

Contractor Signature_____ Date_____
(Name/Representing)

Vendor Days Used_____

I hereby certify that my operating personnel received _____ hrs. of instructions from
_____

Operator Signature_____ Date_____
(Name/Representing)

Attendees: _____
_____

Post Start-Up Training

I hereby certify that the equipment supplier/manufacturer has instructed Owner's personnel in the start-up, operation and maintenance of this equipment as required in this specification.

Contractor Signature_____ Date_____
(Name/Representing

Vendor Days Used_____

I hereby certify that my operating personnel received _____ hrs. of instructions from
_____

Operator Signature_____ Date_____
(Name/Representing)

Attendees: _____
_____

Robert E. Lee & Associates, Inc.

Job Number 4931-001

Receipt For Spare Parts/Equipment Checklist

Item: _____

Contract Specification Section: _____

Sub-Section: _____

Page: _____ By: _____ Date: _____

Item No.	Item Description	Unit	Quantity		Designated Storage Location	Remarks
			Req.	Rec.		

The above items have been stored or erected at the designated storage location. All quantities and items are in accordance with Contract Specification requirements.

Owner: Oak Creek Water And Sewer Utility By: _____

Title: _____

Date: _____

Contractor: _____ By: _____

Title: _____

By: _____

Engineer: Robert E. Lee & Associates, Inc.

SECTION 11306

SPLIT CASE PUMPS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section includes furnishing and installing single stage, double suction split case pumps and accessories in accordance with the plans and specifications.

B. Related Sections and Divisions:
   1. Applicable provisions of the General Conditions shall govern work in this section.
   2. Section 01730 – Operation and Maintenance Data
   3. Section 11000 – Installation and Training Checklists
   4. Division 16 – Electrical

1.02 REFERENCES

A. Hydraulics Institute (HI)

B. American National Standards Institute (ANSI)

C. National Electric Code (NEC)

D. NEMA Electrical Standards

E. Underwriter's Laboratory

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01300, Submittals:
   1. Shop drawings including assembly and installation drawings and naturals of construction.
   2. Assembled electrical and control equipment drawings for all components.
   3. Pump data including:
      a. Name of manufacturer.
      b. Type and model.
      c. Design rotative speed.
      d. Weight of pump and motor assembly.
      e. Complete performance curves showing:
         (1) Capacity.
         (2) Discharge Pressure.
         (3) Efficiency.
         (4) Brake Horsepower.
      f. Materials of construction and cross-sectional drawing.
   4. Field testing and start-up report.

B. Submit operation and maintenance in accordance with Section 01730, Operation and Maintenance Manuals.

C. Submit installation and training checklists in accordance with Section 11000.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Fairbanks Morse.

2.02 PUMP

A. Design each pump for the following design conditions:

	Requirements	Lower Pressure Zone Booster Station	Upper Pressure Zone Booster Station
1.	Type of liquid to be handled.	Water	Water
2.	No. of pumps.	2	4
3.	Type of drive.	Constant Speed	Constant Speed
4.	Design Condition 1		
	(a) Flow, GPM	1,500	1,500
	(b) TDH, feet	60	85
5.	Design Condition 2		
	(a) Flow, GPM	3,500	2,000
	(b) TDH, feet	34	66
6.	Pump RPM maximum.	900	1,800
7.	Minimum motor horsepower.	50	50
8.	Voltage, phase.	480/3	480/3
9.	Minimum efficiency % at Design Condition 1, RPM, TDH	72	75
10.	Maximum NPSHr at Design Condition 2.	9.38	13.2

B. General

1. The pump shall be capable of handling potable water.
2. Rotating Assemblies shall be balanced in accordance with the requirements of ANSI S 2.19,G6.3.
3. Vibration shall not exceed the limitations specified by the Hydraulics Institute.

C. Pump Casing

1. Pump casing shall be of close grain cast iron type ASTM A48, class 40, designed for heavy-duty service. The casing shall be horizontally split; single volute type with the suction and discharge flanges cast integrally with the lower half in order that the upper part may be removed for inspection of the rotating element without disturbing pipe connections or pump alignment.
2. Pump mounting feet are to be cast integrally into the lower half casing. The joint between halves of the casing shall be heavily flanged and bolted, and provided with dowel pins to insure accurate alignment. The upper half-casing flange shall have tapped holes for jackscrews. The interior shall be smooth and free from surface defects.
3. Thickness, diameter, and drilling dimensions of suction and discharge flanges shall be 125 lb ANSI drilling. Low zone booster pumps shall have a minimum 14" suction flange and a minimum 12" discharge flange. High zone booster pumps shall have a minimum 10" suction flange and a minimum 6" discharge flange.

D. Impeller

1. Impeller shall be of the double suction enclosed type made entirely of ASTM B584-836 bronze finish smooth all over and of ample strength and stiffness for maintaining the maximum capacity of the unit.
2. It shall be statically and dynamically balanced and shall be keyed to the shaft and securely held in axial position on the shaft by means of ASTM B505-954 bronze sleeves extended through the stuffing box. Rotation of the shaft sleeves shall be prevented by the impeller key, which shall extend beyond the impeller hub and into the shaft sleeve on both sides of the impeller. Shaft sleeves shall be held in position by a locking shaft sleeve nut located outside of the stuffing box and shall have an O-ring seal between the sleeve and the nut to prevent entrance of air or liquid between the shaft and sleeve. Sleeves, which are threaded on to the pump shaft, are not acceptable.

E. Wear Rings

1. At the running joint between the suction and discharge chambers, there shall be provided wear rings on both the casing and impeller.
2. The casing rings shall be of ASTM B505-927 bronze, positioned in the casing and locked against rotation by the upper half of the case.
3. Impeller rings shall be of ASTM B505-932 bronze, so fastened that they cannot rotate or become loose when the pump is subjected to reversed rotation.

F. Pump Shaft

1. The shaft shall be manufactured of high-quality, heat-treated steel of sufficient diameter to allow no greater than 0.003" maximum deflections as measured at the sealing box for all normal performance conditions on the curve.
2. The shaft shall be accurately machined over its entire length. Shaft shall be manufactured to meet stiff shaft construction with a critical speed at least 25% in excess of operating speed, in order to prevent vibration and fatigue.
3. No threads shall be machined on the pump shaft adjacent to the impeller.

G. Stuffing Boxes

1. Stuffing boxes shall be provided with mechanical seals.
2. Stuffing boxes shall accept packing or mechanical seals without modification to the stuffing box.
3. Mechanical seals shall be furnished with a carbon seal ring, ceramic mating ring, viton elastomers and 316 stainless steel metal parts.
4. Pump shaft sleeves shall be furnished with a pre-machined groove designed to accept a setting ring, which shall eliminate the need for set collars or stop collars. Seals requiring stop or set collars with set-screws are not acceptable.
5. The rotating seal ring shall be provided with a 360 degree rubber encasement to provide a positive drive for the seal face without the need for metal drive notches which may cause face distortion or notch wear. The seal rings shall be permanently fixed in place and full flatness maintained by a precision crimp in the outer seal case.
6. The mechanical seal shall be of a convoluted design which permits free movements providing constant adjustment for shaft endplay and seal face wear. Positive face contact with the stationary seat shall be maintained at all times.
7. To insure positive sealing by free movement of the seal head, the seal shall feature a hex style outer shell and drive band which shall absorb start-up and running torque and shall

eliminate in stress on the diaphragm. Metal components shall freely engage and shall not be subject to lock down due to friction wear.

8. Suitably valved connecting lines or passages shall be provided on the upper half casing leading from the discharge volute to the stuffing box for lubricating the stuffing boxes with the liquid being pumped.

H. Bearings

1. Bearings shall be of the anti-friction type grease lubricated ball.
2. The bearings shall be single row deep grooved anti-friction bearings. The inboard bearing shall be designed to take the radial thrust loads. The outboard bearings shall be designed to take a combination of loads, both radial and axial; and hold the rotor in axial alignment.
3. Bearings shall be grease lubricated and bearings designed for an L10 life of 100,000 hours per AFBMA at best efficiency point. Bearings shall be mounted in dust tight housings shall be rigidly supported by suitable brackets, which shall be cast with integrally with the lower half or the pump casing. Bearing housings or bearing housing supports, which are bolted to the side of the pump casing, are not acceptable.
4. A deflector made of Nitrile shall be provided on the inboard and outboard ends of the pump shaft to prevent product from entering either bearing housing.

I. Pump Base

1. The pump and motor shall be mounted on a common base of fabricated ASTM A36 structural steel. Bent metal or formed bases are not acceptable.
2. The base shall be provided with a coupling guard, ample grout holes and drip lip rim.
3. All mounting surfaces shall have a machined finish.

2.03 MOTOR AND CABLE

A. Motors shall be Open Dripproof (ODP) for premium efficiency and conform to Division 16, Electric Motors. Motor RPM shall be coordinated with requirements of pump operating speed.

2.04 ELECTRICAL CONTROL SYSTEMS

A. Electric controls shall be provided and is described in Division 16.

2.05 DATA PLATE

A. Pump manufacturer shall attach data plates to pump and frame.

1. Plate shall be stainless steel or brass.
2. Information on pump plate.
   a. Manufacturer's name.
   b. Pump size and type.
   c. Serial number.
   d. Speed.
   e. Capacity.
   f. Head rating.
   g. Any other pertinent data.
3. Information on frame.
   a. Identification of frame.
   b. Bearing numbers.

2.06 SPARE PARTS

A. Provide manufacturer recommended spare parts.

2.07 PAINTING

A. Shop Painting
   1. Pump and baseplate shall be commercially blasted and prime coated with one 3 mil DFT coat of red oxide primer.
   2. Non-ferrous material and galvanized surfaces shall remain Unpainted.
   3. Drive units and controls shall remain the manufacturer's standard paint.

B. Field Painting:
   1. Conform with Section 09800, Painting.

2.08 TESTING

A. A certified factory hydrostatic and performance test be performed on all pumps in accordance with Hydraulic Institute Standards, latest edition. Tests shall be sufficient to determine the curves of head, input horsepower, and efficiency relative to capacity from shutoff to 150% of design flow. A minimum of six points, including shutoff, shall be taken for each test. At least one point of the six shall be taken as near as possible to each specified condition.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install in accordance with the shop drawings and manufacturer's recommendations. After installation, demonstrate trouble free operation in presence of the Engineer.

3.02 FIELD TESTING

A. All necessary precautions recommended by the Manufacturer and as specified herein shall be followed to ensure that the pump and piping connected thereto is completely clean and free of any debris, dirt, or other foreign materials which could clog the pumps, piping and interfere with operation.

B. Field testing shall be conducted on the equipment provided. Each pump shall be subjected to an operational test before acceptance as follows:
   1. The pump shall be properly installed and verified by the manufacturer. After installation verify the service voltage and proper rotation of the impeller.
   2. Pump shall be demonstrated to operate without excessive noise, vibration, and without overheating at its rated condition.
   3. All components and operation sequences, as specified herein, shall be tested in the field to verify proper operation in accordance with this specification.

C. All testing shall be performed under the supervision of the Manufacturer's representative in the presence of the Engineer.

D. Engineer shall be notified in advance of any field tests.

E. The field test must meet the performance requirements as described in this specification. Tests shall be extended or repeated if, in the opinion of the Engineer, additional time is needed to make observations.

F. All defects noted during the field test shall be corrected promptly at the expense of the Manufacturer.
   1. When necessary, the field test shall be repeated until the requirements of the specification have been met.
   2. All testing and modifications required to the meet the specification shall be at the expense of the Manufacturer.

G. If the Manufacturer is unable to demonstrate by the field test results that the equipment conforms to the requirements of the specification, the equipment shall be rejected and replaced with acceptable equipment at the Manufacturer's expense.

H. Minimum start-up time for operator training and final adjustment by the Manufacturer shall be one (1) day with one (1) trip.

I. The time for start-up and operator training and final adjustment shall be designated by the Owner and shall be within the one-year warranty period after final acceptance of equipment by the Owner.

J. Qualifications of Start-Up Personnel
   1. Personnel shall be authorized by the Manufacturer to start-up and initiate the warranty of the equipment being provided.
   2. Personnel shall come to the site with the required tools to complete start-up.
   3. Personnel shall have full working knowledge of the equipment being provided.
   4. Failure to provide personnel with full qualifications shall be cause for service trip to be disqualified as part of the requirements and shall because for reimbursement costs incurred by the Owner due to services required for start-up inspections.

- END OF SECTION -

15

DIVISION 15

MECHANICAL

SECTION 15010

BASIC HVAC REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section defines the methods & materials for HVAC equipment. Provide all labor, materials, tools, and equipment.

B. Related Sections and Divisions:
1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Section 01730, Operation and Maintenance Data.
4. Section 05500, Metal Fabrications.
5. Section 15050, Methods and Materials for Piping Installations

1.02 GENERAL

A. Hereinafter, the terms "Mechanical System" and "Mechanical Equipment" shall be intended and interpreted as defining the terms "Heating, Ventilating and/or Air Conditioning System or Equipment".

B. If the bidding documents contain conflicting information or discrepancies, the bidder shall base his bid upon the conflict or discrepancy which will result in the highest first cost.

C. The drawings are schematic in nature. All required ductwork and piping offsets, transitions, fittings, and supports shall be included in the base bid to accommodate actual field conditions. Final locations of all work shall be coordinated in the field and installed where directed by the Owner's Representative.

1.03 REFERENCE STANDARDS

A. Abbreviations of standards organizations referenced in other sections are as follows:
1. AABC - Associated Air Balance Council
2. ABMA - American Boiler Manufacturers Assoc.
3. ADC - Air Diffusion Council
4. AGA - American Gas Assoc.
5. AMCA - Air Movement & Control Assoc.
6. ANSI - American National Standards Institute
7. ARI - Air Conditioning & Refrigeration Institute
8. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers
9. ASME - American Society of Mechanical Engineers
10. ASTM - American Society of Testing and Materials
11. AWWA - American Water Works Assoc.
12. AWS - American Welding Society
13. CGA - Compressed Gas Assoc.
14. CTI - Cooling Tower Institute
15. EPA - Environmental Protection Agency
16. GAMA - Gas Appliance Manufacturers Assoc.
17. IEEE - Institute of Electrical & Electronics Engineers
18. ISA - Instrument Society of America

19. MCA - Mechanical Contractors Assoc.
20. MICA - Midwest Insulation Contractors Assoc.
21. MSS - Manufacturer's Standardization Society of the Valve & Fitting Industry, Inc.
22. NBS - National Bureau of Standards
23. NEBB - National Environmental Balancing Bureau
24. NEC - National Electric Code
25. NEMA - National Electrical Manufacturers Assoc.
26. NFPA - National Fire Protection Assoc.
27. SMACNA - Sheet Metal & Air Conditioning Contractors National Assoc., Inc.
28. UL - Underwriters Laboratories, Inc.

1.04 QUALITY ASSURANCE

A. Substitution of Materials: Refer to the General Conditions of the Contract.

B. Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the contractor is responsible for all costs involved in integrating the equipment or accessories into the system and for obtaining the performance from the system into which these items are placed. This may include changes found necessary during the testing, adjusting, and balancing phase of the project.

1.05 PROTECTION OF FINISHED SURFACES

A. Touch-up all scratches as directed by Engineer using factory finish.

B. Furnish one can of touch-up paint for each different color factory finish, which is to be the final finished surface of the product. Deliver touch-up paint with other spare parts.

1.06 WORK NOT INCLUDED

A. All openings, except those formed by pipe sleeves, required in the new general construction to accommodate the mechanical equipment.

B. Fused and/or circuit breaker disconnect switches except as indicated otherwise.

C. Installation of roof curbs.

D. Electric wiring from panelboards to starters and from starters to motors.

E. Installation of all starting equipment.

F. Gas meter and gas supply piping from utility company's main to the meter.

G. Furnishing and installation of lintels and sheet metal sills for weatherproof louvers.

H. Installation of weatherproof louvers.

1.07 CODES, PERMITS, TAXES AND CERTIFICATES OF INSPECTION AND APPROVAL

A. This system shall be installed in accordance with all national, state and local codes and regulations.

B. Mechanical equipment shall comply with the requirements of Chapter Ind. 63 of the Wisconsin Energy Conservation Code.

C. The Contractor shall secure and pay for all permits, licenses and certificates of inspection applicable to this work, including registration certificates for refrigerating systems as described in Para. Comm. 45.07 of the Mechanical Refrigeration Code.

D. The Contractor shall pay for all taxes applicable to this work.

E. Copies of the certificates shall be included in the Operating and Maintenance Instructions.

1.08 SHOP DRAWINGS

A. The Contractor will be held responsible for correction of work deemed necessary by the Engineer due to proceeding with the work without certified drawings that have the Engineer's final approval.

B. Certified drawings shall include data on physical dimensions, gauges, materials of construction and capacities.

C. Incomplete certified drawings will be disapproved.

D. Manufacturers shall check the plans and verify that their equipment can be installed in the space allotted and still have adequate room for servicing.

E. Approval of certified drawings describing equipment that cannot fit in the space allotted does not relieve the Contractor from furnishing and installing equipment that will meet the space requirements.

F. Approval of certified drawings not fully describing or specifically stating all components of a major item or system shall not be construed to indicate that these items may be omitted or are not required. All components necessary to comply with the requirements of the system or the intent of the plans and specifications and all governing codes and regulations must be furnished an installed.

G. Approval of certified drawings covering equipment that does not meet the requirements of the plans and/or specifications does not relieve the Contractor from furnishing and installing the equipment required.

H. Submit to Engineer for approval manufacturer's certified drawings for all equipment except ductwork and piping per Section 01300, Submittals.

1.09 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Prepare and deliver to the Engineer per Section 01730, Operation and Maintenance Data.

1.10 FINAL REQUIREMENTS

A. Materials, fittings, apparatus, fixtures, etc., not particularly specified or shown on plans but necessary to provide a first class mechanical system for the building, must be furnished notwithstanding such omission.

B. At the completion of the work, the entire plant must be delivered to the Owner in perfect working order with all joints tight, valves packed and adjusted.

C. All equipment utilizing air filtering equipment shall have all throwaway filters replaced with new filters and all permanent filter media thoroughly cleaned before presenting the system to the Owner for acceptance.

D. Balance the entire air system to deliver and exhaust air quantities as designated, with allowable error of plus or minus 5%. Submit to the Engineer in triplicate, complete air balancing data sheets as hereinbefore specified.

E. All tests and trials of the entire system requested or directed by the Engineer must be made by the Mechanical Contractor free of charge before acceptance of the work.

F. Upon completion of the installation, but before final acceptance of the system, the Contractor shall in the presence of the Engineer instruct the Owner on the care and operation of all parts of the system.

1.11 GUARANTEE

A. This Contractor guarantees all work, new material and apparatus to operate to the satisfaction of the Engineer for one year from the completion and acceptance of the system and must keep same in repair for said period, unless such defects are clearly the result of bad management after apparatus is out of his control. The guarantee period shall start at substantial completion of the contract.

B. The ventilating system shall be guaranteed to deliver and exhaust amounts of air as noted on plan to within plus or minus 5%.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.01 EQUIPMENT SUPPORTS

A. General:
1. Furnish and install all equipment supports as indicated or required for the installation of all mechanical equipment, including miscellaneous upper steel as required to frame into overhead construction for distribution of weight.

B. Equipment Supports:
1. Equipment supports in the form of pipe stands, rails, suspension frames, brackets, braces, etc., shall be furnished and installed for mechanical equipment indicated and/or required to have steel supports. All supports shall be as specified in Section 05500, Metal Fabrications and Section 15050, Methods and Materials for Piping Installations and as shown on the details.
2. Shall be constructed to properly support and distribute the load.
3. Shall incorporate anti-vibration devices, anti-sway bracing, saddles and anchoring plates as required.

C. Roof Curb Mounted Equipment:
1. Roof curbs shall be sized to accommodate the roof openings and curb flange of the equipment being mounted.
2. Roof curbs shall be per Section 07720 Roof Accessories.

3. See plans for roof deck, type and pitch.
4. Flashing and roof sealing of curbs including sealing of flashing flanges, cant strips, pitch seals at anchor bolts, etc., shall be coordinated with the General Contractor.

3.02 SLEEVES, OPENINGS, CUTTING AND PATCHING

A. Provisions for openings (except pipe sleeves) but including chases, holes and clearance through walls, floors, roof, ceilings and partitions shall be made in advance of construction of such parts of the building. These openings shall be coordinated with other trades during the construction of the building.

B. In event holes must be cut through reinforced concrete, drill carefully so as to avoid spalling and unnecessary damage or weakening of structural members. No chopping or breaking out permitted.

C. Precedence in installing equipment and piping in close quarters will be as determined by the Engineer but no contractor has exclusive right-of-way in installing his work.

D. Confer and cooperate with other trades and agree as to running of pipe lines and ducts subject to Engineer's approval.

E. Pipe Sleeves shall be as noted on the drawings and as specified in Section 15050, Methods and Materials for Piping Installation:

3.03 DUCT TRIM STRIPS

A. Provide finish trim strips of 20 gauge galvanized formed sheet aluminum for all exposed ductwork wall penetrations.

3.04 GENERAL

A. Equipment Access:
1. Install all piping, conduit, ductwork, and accessories to permit access to equipment for maintenance. Coordinate the exact location of wall and ceiling access panels and doors with other trades, making sure that access is available for all equipment and specialties.

B. Coordination
1. Verify that all devices are compatible for the surfaces on which they will be used. This includes, but is not limited to, diffusers, register, grilles, and recessed or semi-recessed heating and/or cooling terminal units installed in/on finished surfaces.
2. Coordinate all work with other contractors prior to installation.
3. Coordinate the installation of the gas meter and confirm gas pressure with the utility responsible for gas service to the building.

C. Lubrication
1. Lubricate all bearings with lubricant as recommended by the manufacturer before the equipment is operated for any reason. Once the equipment has been run, maintain lubrication in accordance with the manufacturer's instructions until the work is accepted by the Owner. Maintain a log of all lubricants used and frequency of lubrication; include this information in the Operating and Maintenance Manuals at the completion of the project.

- END SECTION -

SECTION 15050

METHODS AND MATERIALS FOR PIPING INSTALLATION

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section defines the methods and materials for process piping installation. Provide all labor, materials, tools, and equipment to install the process plant piping.

B. Related Sections and Divisions:
1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Section 01661, Testing & Inspection of Pipeline Construction.
4. Section 02616, Ductile Iron Pipe.
5. Section 02617, Steel Pipe.
6. Section 02618, Stainless Steel Pipe.
7. Section 02622, PVC Plastic Pipe.
8. Section 05500, Metal Fabrications.
9. Section 09800, Painting & Special Coatings.

1.02 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300, Submittals including:
1. Product data for couplings, expansion joints and wall seals.
2. Drawings for all types of hangers, joints, supports, and materials used in the piping system.
3. Piping drawings that show piping layout, couplers, adaptors, wall pipe, sleeves, etc.

PART 2 - PRODUCTS

2.01 PIPING MATERIAL SCHEDULE

A. All pipe and fittings for process piping shall be in accordance with the schedules at the end of this section.

2.02 VALVES

A. All valves shall be as shown on the drawings and shall conform to section: "Valves."

2.03 PIPING MATERIAL SPECIFICATIONS

A. Refer to Section 02616 for ductile iron pipe.

B. Refer to Section 02617 for steel pipe.

C. Refer to Section 02618 for stainless steel pipe.

D. Refer to Section 02622 for PVC plastic pipe.

E. Refer to Section 02623, Polyethylene Pipe.

2.04 PIPING RELATED MATERIALS

A. Bolts and Nuts
   1. Carbon steel standard treated bolts and studs conforming to ASTM A307, Grade B, and nuts conforming to ASTM A563, Grade B. Stainless steel bolts & nuts grade 316 shall be used where indicated on the drawings.

B. Gaskets
   1. Blended natural/SBR red rubber, 1/8-inch thick sheet packing 70-85 shore durometer.

2.05 COUPLINGS AND ADAPTORS

A. Mechanical couplings used for joining plain end of pipe of the same diameter shall be Dresser style 38, Rockwell type 411, or equal.

B. Mechanical couplings for joining steel, plastic, or ductile iron pipe of different outside diameters up to ¼ inch difference shall be Dresser style 162, Rockwell type 413, or equal.

C. Mechanical couplings for joining steel, plastic, or ductile iron pipe of different outside diameters larger than ¾ inch difference shall be reducing coupling Dresser style 62, Rockwell style 415, or equal. Compression coupling for joining small diameter pipe shall be Dresser styler 68, Rockwell type 521, or equal.

D. Expansion joint couplings used in absorbing concentrated pipe movement for steel and cast iron pipe shall be Dresser style 63, Rockwell type 611, or equal.

E. Flanged coupling adaptors used for joining plain end pipe to flanged valves and fittings for steel or cast iron pipe shall be Dresser style 128, Rockwell type 913, or equal.

2.06 EXPANSION JOINTS

A. Acceptable manufacturer shall be General Rubber Series 1100, or equal.

B. Flexible connections shall be provided as shown on the plans for all pumps, blowers, and other items of equipment, which may induce vibration to the piping system.

C. Flexible connector shall be neoprene, except for aeration blowers shall be EPDM.

D. Joints shall allow a minimum of 0.625 inches pipe expansion, 0.25 inches pipe compression.

E. Flexible connectors shall be constructed with a filled arch to eliminate sedimentation of solids in the arch area.

F. Tie rods shall be provided at all flexible connectors and expansion joints on pump discharge. These tie rods shall be of sufficient number and strength to restrain the connection at test pressure as required. Use a minimum of two 5/8-inch diameter tie rods at all connections.

G. Reducing flanged expansion joints (eccentric and concentric) used shall be General Rubber, Series 1100 GR/ER, or equal.

2.07 WALL SLEEVES AND SEALS

A. All process piping passing through below ground or water bearing concrete walls shall be installed utilizing wall pipe. Wall pipe castings shall have mechanical joints on the building exterior & flange joint on the building interior.

B. All process piping passing through above ground concrete or masonry walls shall be installed utilizing wall sleeves or stainless steel sleeves as shown on the drawings. When sleeves are used the gap between the sleeve and the pipe shall be large enough to accommodate the specified insulation or at a minimum two inches larger than the pipe.

C. Where pipes pass through interior walls or floors use stainless steel sleeves two inches larger than outside diameter of the pipe. A gap between the sleeve and the pipe shall be sealed using the specified sealant.

D. Rotary drilled holes can be used for pipe penetrations through existing walls. For exterior of water bearing walls, the annular space between outside surfaces of the pipes passing through the drilled hole and the interior surfaces of the wall sleeves shall have a watertight seal.
   1. The annular space shall be sealed by a modular mechanical type unit consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening. The modular unit shall form a continuous rubber belt around the pipe with a pressure plate under each bolt head and nut. Compression of the unit shall cause the rubber sealing elements to expand and provide a watertight seal. All hardware shall be 316 stainless steel.

2.08 MECHANICAL PIPE SUPPORT DEVICES

A. Manufacturers shall be Grinnell, Cooper B-Line, or equal. All pipe support devices used on this project shall conform to the details in this section. Each pipe support shall consist of a pipe attachment (PA-1 through PA-16) or pipe guide (PG-1 through PG-3) and the appropriate structural attachment (SA-1 through SA-15). All pipe supports, hangers, and anchors shall be type 304 stainless steel. Upon approval by the Engineer, hot dipped galvanized pipe supports and hangers may be acceptable if stainless steel is not available. Pipe supports & hangers for pipe larger than 12-inches are as detailed on the drawings.

B. Concrete Inserts
   1. Concrete inserts shall be provided at locations to support piping where structural steel supports are not readily available. Inserts shall be located so that total load on any insert does not exceed the manufacturer's recommended maximum load. The location of all inserts shall be approved by the Engineer.
   2. Where it is necessary to anchor supports to hardened concrete or completed masonry, expansion anchors shall be used. All expansion anchors shall type 316 stainless steel and be sized as required for the service with a minimum safety factor of five.
   3. Continuous slot inserts shall be Grinnell figure SG200, or equal.
   4. Individual inserts shall be Grinnell figure 282, hot dipped galvanized, or approved equal.

C. Precast Prestressed Concrete

1. Where it is necessary to anchor supports to precast prestressed concrete, a steel plate of sufficient size shall be anchored to the upper surface. A hole of proper size shall be provided in the center of the plate for the support rod. The plate shall be placed over a field drilled hole through the precast prestressed concrete. The hole shall be drilled and the plate anchored as approved by the precast manufacturer and Engineer.

D. Pipe Hangers

1. All piping shall be so installed so that it will be free to expand and contract without creating undue stresses in the piping system. All supports and hangers shall be so constructed and adjusted to allow for proper pitch of pipes. Where grooved and shouldered type joints and couplings are used, a hanger shall be placed within 2' of each side of the fittings to keep the pipes in alignment.
2. All hangers shall be stainless steel. In all cases, the contractor shall provide enough supports of the proper type to insure a functional and safe piping system. If the contractor proposes to use different pipe material or different joint fittings, he shall provide any additional hangers or supports necessary at no additional cost to the Owner.
3 Hangers used on copper pipe placed directly on the pipe shall be copper or stainless steel.
4. All hanger rods 24 inches or shorter shall be continuous thread type. All rods shall be stainless steel.
5. All structural steel, angles, rods, channels, etc. used for pipe hangers shall be hot dipped galvanized after fabrication or shall be stainless steel.
6. Hangers for fiberglass reinforced plastic (FRP) pipe shall be saddle type.
7. Trapeze hangers shall be constructed of angle, channel or other structural shapes type 304 stainless steel or hot dipped galvanized with flat surfaces for point of support. The support member shall be of sufficient weight to avoid deflections which may cause undue stresses on the pipes being supported. The hangers shall be constructed to permit vertical adjustment of at least 1½ inches after installation.
8. Pipe hangers shall be as detailed at the end of this section or as shown on the drawings.

E. Vertical Pipe Supports

1. Vertical pipe supports shall be constructed of 304 stainless steel equipped with pipe saddle supports at the top and flanged at the floor.
2. The pipe saddle support shall be adjustable to approximately 2½ inches.
3. Vertical pipe supports shall be as detailed at the end of this section or as shown on the drawings.

F. Anchors

1. For suspended piping, anchors shall be centered, as closely as possible, between expansion joints and between elbows and expansion joints. Anchors shall hold the pipe securely and shall be sufficiently rigid to force expansion and contraction movement to take place at expansion joints and elbows.
2. Anchorage shall be provided as required to resist thrusts due to changes in diameter or direction or dead ending of pipe line. Anchorage shall be required wherever bending stresses exceed the allowable for the pipe.

2.09 PIPE INSULATION

A. General

1. Insulation products shall be manufactured by Armstrong, CertainTeed, Knauf, Manville, Owens-Coming, Partek, Pittsburgh Coming, Rubatex, Spoule or Engineer approved equal.
2. Insulation materials shall be compatible with stainless steel equipment, tanks and piping and shall be guaranteed not to cause stress corrosion cracking of stainless steel or copper tubing.
3. Asbestos and asbestos bearing materials shall not be used.
4. All products including vapor barriers and adhesives shall conform to NFPA 90A and 255 and shall have a flame spread rating less than 25, fuel contributed rating less than 50 and a smoke developed rating less than 50.
5. All material shall be fire retardant, moisture resistant, mildew resistance, vermin proof and suitable for the temperatures to which they are applied.
6. All material shall be delivered in good condition, and the packages and insulation shall be plainly marked with manufacturer's identification label.

B. Pipe Insulation Materials

1. Piping insulation includes insulating material, protective jackets, flashing, and other materials as required for a complete and waterproof system. Insulation shall be provided as shown on the drawings and as specified in the Piping System Specification Sheets. Surfaces to be insulated include piping and related vessels and appurtenances.

a) Low Temperature Insulation

Insulation for low temperature applications (-30°F to 75°F) shall be flexible unicellular type conforming to Fed. Spec. HH-I-573, Class 1. Adhesive and accessories shall be as recommended by the manufacturer.

b) Medium Temperature Insulation

Insulation for medium temperature applications (76°F to 370°F) shall be fiberglass conforming to the requirements of ASTM 1393 & ASTM C1136 Type I All Service Jacket (ASJ). Adhesive and accessories shall be as recommended by the manufacturer.

c) High Temperature Insulation

Insulation for high temperature applications (1200°F) shall be calcium silicate type conforming to the requirements of Fed. Spec. HH-I-523, Type II. Adhesives and accessories shall be as recommended by the manufacturer.

d) Protective Jacket

A protective jacket shall be provided for all heated surface insulation. Protective jackets shall be fabricated from aluminum, stainless steel, or laminated polyvinyl materials as specified.

SYSTEM 1) Aluminum Jacket

Aluminum jacket shall be provided for heated surfaces and piping larger than 8 inches in diameter. The jacket shall be constructed of plain finish aluminum sheet conforming to ASTM B209, alloy 5005, with a minimum temper of H16. The jacket shall be 36 inches minimum width and shall be 0.020-inch thick on surfaces 14 inches in diameter or larger and 0.016-inch thick on smaller diameter surfaces. The jacket shall be provided with an impermeable water barrier on the inside. The jacket should be held in place with aluminum rivets. The spacing and quantity of rivets shall be such that there are no gaps in the jacket and all seams are tight.

SYSTEM 2) Stainless Steel Jacket

Stainless steel jacket shall be provided for heated surfaces and piping larger than 8 inches in diameter. The jacket shall be constructed of

embossed 304 stainless steel. The jacket shall be 36 inches minimum width and shall be 0.020-inch thick on surfaces 14 inches in diameter or larger and 0.016-inch thick on smaller diameter surfaces. The jacket shall be provided with an impermeable water barrier on the inside. The jacket should be held in place with stainless steel rivets. The spacing and quantity of the rivets shall be such that there are no gaps in the jacket and all seams are tight.

SYSTEM 3) Laminated Polyvinyl Jacket

Laminated polyvinyl Jacket shall be provided for heated piping 8 inches in diameter and smaller. The jacket shall be polyvinyl chloride. Jacket color shall be selected from the manufacturer's standard colors. Joint tape shall be vinyl, 10 mils thick. Fittings, valves, flanges, and other similar items shall be jacketed with 15 mils thick premold PVC. PVC jacketing and type shall be spray-coated to match PVC jacket color.

e) Shields

Shields for the protection of chilled surface insulation shall be 16-gauge galvanized steel sheet, 9 inches long and formed into a half cylinder.

f) Flashing

Flashing shall include aluminum caps, sealant and reinforcing as required. Aluminum cap shall be 0.020-inch thick and shall be cut to completely cover the insulation. Sealant for surfaces heated up to 370°F shall be constructed from silicone based material. Sealants for hotter surfaces shall be as recommended by the high temperature insulation manufacturer. Sealants for low temperature insulation shall consist of manufacturer's adhesive.

Reinforcement shall not be required for low temperature flashing. Reinforcement in flashing heated to 370°F shall be nylon fabric. Reinforcement in flashing for hotter surfaces shall be wire mesh or as recommended by the high temperature insulation manufacturer.

C. Jackets and Specialties

1. Provide matching smooth finish fitting covers or field fabricate from jacket material.

PART 3 - EXECUTION

3.01 GENERAL

A. Pipe, fittings, specialties and material used are to be carefully inspected for defects and thoroughly cleaned before installation.

B. It shall be the responsibility of the Contractor to coordinate the work with all other trades to insure proper scheduling of inter-related work so as not to cause unnecessary delays or upset the treatment plant process to the extent that they violate their permit.

C. Contractor supplying pipe, fittings, and valves shall be responsible for coordinating the diameter, drilling, and pressure rating of flanges for all valve and equipment connections.

D. Gauges, valves or any other equipment located in walls, above ceilings or in any other inaccessible location shall have access provided. In plaster or masonry, Contractor shall provide

metal access doors. Acoustical ceilings shall be provided with removable panels and marker tabs on each panel.

E. The drawings are diagrammatic as to what is required. The Contractor shall consult the architectural, structural, electrical and other mechanical drawings for true dimensions, details, obstructions, and conflicts.

F. Dimensions given in figures shall take precedence over scaled dimensions. The architectural plans shall take precedence over mechanical and electrical plans.

G. Piping drawings are drawn for maximum clarity and are not necessarily intended to indicate a dimensional location. Piping shall be grouped on walls and ceilings and shall be coordinated and run with other mechanical and electrical work to allow a neat and workmanlike finished appearance.

H. Install pipe runs in straight lines parallel to or at right angles to the walls, floors, or other pipe runs.

I. Do not run pipe through structural beams.

J. Installed piping shall not interfere with the operation or accessibility of doors or windows, shall not encroach on aisles, passageways, and equipment, and shall not interfere with the servicing or maintenance of any equipment.

K. All pipe passing through roof shall have flashing.

3.02 CONNECTIONS TO PUMPS, VESSELS AND EQUIPMENT

A. Piping shall be erected and supported in a manner that shall not put undue strain on pumps, tanks or equipment.

B. The procedure for connection of piping to equipment shall be as follows:
   1. After the equipment has been set and grouted, the pipe shall be run to the equipment without making any tight connections to flanges.
   2. Flat faced flanges and full-face gaskets shall be used on piping connecting to valves and equipment with flat flanges. Raised faces of standard flanges may be machined off flat to accomplish this.
   3. Flanges shall be checked by the Owner's representative to assure that no strain is placed on the equipment. If pipe is not in correct alignment, the piping shall be removed and corrected. The correction in alignment shall not be made while the pipe is connected to the equipment.
   4. No piping shall be connected to equipment until sufficient permanent support has been installed.

C. After alignment is found to be correct by the Owner's representative, the flanges shall be bolted up.
   1. The Owner's representative will observe the dial indicators on the coupling. If the piping has moved the equipment alignment in excess of the 0.005 inch T.I.R. allowable, the piping will be reworked until no strain is exerted on the equipment by the pipe. If the

piping has thrown the equipment out of alignment, the coupling shall be realigned to within the 0.005-inch maximum tolerance.

2. Any equipment realignment work due to excessive strain caused by piping shall be at the piping contractor's expense.

D. After the equipment has been in service, tested at operating temperatures and with the lines and equipment still hot, flanged connections to pumps, tanks and equipment shall be loosened and checked for alignment, position, expansion and strain applied to the equipment and make any adjustments necessary, and secure approval of the Owner's representative before reconnecting.

3.03 DRAIN CONNECTIONS AND CLEANOUTS

A. Drain connections and suitable valves shall be provided for all equipment and piping (pumps, tanks, etc.) and for all piping systems at low points in the system for draining for freeze protection and also for rapid draining of the system for maintenance work.

B. Drain valves shall be located as close as possible to process lines to prevent dead legs.

3.04 VALVES

A. Install valves to be accessible with valve operators at a convenient location for operation.

B. Chain wheel operators shall be supplied and installed on valves which are higher than six feet above floors.

3.05 COUPLING AND ADAPTORS

A. Pipe shall be cut clean with smooth ends such that a space is left between pipe ends of not less than ¼ inch or more than 1 inch. Mechanical couplings shall be carefully installed in strict accordance with the manufacturer's recommendation and shall be suitably restrained to prevent movement. The pipe shall be furnished with plain ends which are smooth and round for a distance of at least 10 inch from each end.

3.06 EXPANSION JOINTS

A. Expansion joints shall be adequately supported to prevent stress on joint.

B Vertical supports shall be located within 3 pipe diameters of the connection and shall be provided on each side of the connection.

3.07 WALL PIPES AND SLEEVES

A. Wall pipe shall be furnished and installed true to grade, line, position and plumb or level and shall be maintained during construction by the Contract. Wall pipe shall be placed in position before concrete is poured to insure a watertight anchored connection between the concrete and wall pipe. The wall pipe shall be placed so that the intermediate collar is centered in the wall and shall be carefully aligned.

B. Wall pipe shall be set in the form with the bolt holes and ranges straddling the centerlines horizontally and vertically.

C. Pipe sleeves shall be installed flush with finished surfaces.

D. The annular space on all interior sleeves shall be stuffed and caulked.

3.08 PIPE SUPPORTS

A. Contractor shall design, furnish and install all pipe supports including auxiliary steel, structure attachments, pipe attachments, brackets, trapeze hangers, hanger rods and accessories such as turnbuckles, eye nuts, concrete anchors, inserts, etc. necessary to support the piping systems from the buildings, structures and utility bridges.

1. The design and location of the pipe supports shall be in accordance with this specification and the drawings.
2. Pipe supports shall not be attached to vessels or equipment without the prior written approval of the Owner's representative.
3. Drilling, welding, cutting, and other operations required to attach the piping to such structures shall be a part of these specifications. No structural members shall be drilled or cut into without permission of the Owner's representative and the type contour, etc. of the hole or cut should be specified. No torch cutting will be permitted.
4. Pipe hangers shall not be located closer than 6 inches from equipment or pipelines operated at temperatures greater than 450°F.
5. Any detailed sketches or takeoffs required in connection with the work of pipe erection shall be submitted for approval.
6. Pipe supports shall allow vertical adjustment for pitch and thermal expansion.
7. Uninsulated piping such as stainless steel, copper, etc. shall be installed with isolation shields of like material to prevent galvanic action. Hangers of like material or PVC coated hangers (for piping less than 2½ inches) may also be used.

B. All supports shall be designed to meet all static and operational conditions to which the piping system and connected equipment will be subjected. For supports specified to be designed in accordance with ANSI B31.1, the loads should not be based on increasing the allowable stress level in hanger components by 20%, as allowed by the code.

C. Where supports are not designed and detailed on the drawings, contractor's supports designer shall analyze and determine the piping loads and movements that will exist at any time, including all applicable forces acting simultaneously, and shall design and detail the supports in accordance with the conditions.

D. Hangers shall be designed for installation in the cold position such that the hanger rod is vertical when pipe moves to the hot operating position. The maximum vertical offset between pin-to-pin connections when cold shall be 4 degrees.

E. Where it is necessary to weld to existing structural steel members to carry pipe supports, anchors, etc. the welds for securing the plates to the structural members shall in all cases be parallel to the length and located at web of the structural member. Welding across the flange of existing structural steel members is not permitted. All welding to building structural steel shall be performed by welders qualified in accordance with AWS D1.1, applicable Building Codes, and the welding section of these specifications.

F. In addition to spacing schedule, support pipe as follows:
   1. At each change in direction.
   2. On each side of large valves.
   3. Within 5 feet of each equipment connection.
   4. At all branches or risers.
   5. At all floor openings.
   6. Minimum of one support for each length of cast iron or ductile iron pipe.

3.09 PIPE INSULATION

A. Piping Insulation Installation
   1. Insulation shall be applied over clean, dry surfaces, with all joints butted firmly together. Double layer insulation, where required, shall be applied with section joints staggered. All equipment, tanks, valves, flanges, unions, expansion joints, rigid and flexible couplings and fittings shall be strengthened with reinforcing and insulating cement. Insulation for all of the above items except large equipment and vessels and welded fittings shall be attached to the insulation jacket halves to allow removal without causing damage to adjacent insulation.

      Chilled surface insulation shall be provided with metal shields at each pipe support. Shield inside face shall be coated with insulation adhesive to prevent movement. No strapping will be required. The pipe insulation shall be provided with additional support at each shield. The use of rigid insulation sections will be acceptable. The use of wood or cork inserts is subject to approval.

   2. Protective Jacket
      Jacketing and insulation for heated surfaces shall be interrupted at hangers, anchors, pipe guides, and other support elements, and only that clearance between insulation system and support element which is required to permit a workmanlike installation of the required flashing shall be provided.
      a. Laminated Polyvinyl Jacket
         Laminated polyvinyl jacket shall be applied with all joints taped in conformance with the manufacturer's instructions subject to acceptance by the Engineer.
      b. Aluminum Jacketing
         1) Pipe and Large Surface Jacketing
            Pipe and large surface jacketing shall have longitudinal joints of either the interlocking type or lapping type. The exposed edge of the longitudinal lap shall be crimped tightly to form a stiffened ½-inch hem. Longitudinal joints shall be hidden from view if tightly to form a stiffened ½-inch hem. Longitudinal joints shall be hidden from view if practicable. Longitudinal joints shall be located in the lower half of the pipe and lapped 2 inches so as to shed water.

            End Joints shall be lapped with adjacent jackets 2 inches and strapped. End joints on sloping or vertical runs shall be lapped so as to shed water.

            All jackets shall be held in place by at least one strap at the end joints and one strap at midsection and by as many other straps as required to prevent initial or subsequent distortion of the lapped edge. On flat jacket surfaces

where straps cannot be used to close joints, screws shall be used at a maximum spacing of 6 inches.

2) Fittings and Other Jacketing
Fittings and other jacketing shall be furnished in half sections and shall be fastened as required for pipe jacketing. Jackets shall not be applied until insulating cement has dried.

3. Flashing
Flashing shall be provided at all jacket penetrations and at all jacket terminations.

A heavy tack coat of sealant shall be troweled over the insulation, extending over jacket edge 1-inch and onto pipe or protrusion 2 inches. Reinforcement shall be smoothly stretched over the tack coat after clipping to fit over pipe and jacket. Clipped reinforcing shall be strapped with a continuous band of reinforcing to prevent curling. Sealant shall then be troweled over the reinforcement to a minimum thickness of 1/8-inch.

Aluminum caps shall be formed to fit over the adjacent jacketing and to completely cover coated insulation. Cap shall be held in place with a jacket strap.

On high temperature surfaces, fabricated aluminum caps cemented and tightly clamped to the pipe and strapped to the jacketing may be used following approval.

4. Insulation Thickness

Pipe Size	Low Temp	Med Temp	High Temp*
1/2" to 2"	1"	1"	1-1/2"
2-1/2" to 4"	1"	1-1/2"	2"
6" to 12"	--	2"	3"

*All engine generator exhaust piping and silencer shall be insulated with a minimum of 3 inches of high temperature insulation.

5. Miscellaneous:
   a. In cases where the insulation extends below grade to cover heat traced lines, the insulation shall be covered with 0.020 inch thick 316 stainless steel jacket. All joints on the jacket shall be sealed with waterproof mastic and then the jacket shall receive two coats of "Tape Coat" to make the underground portion of the insulation completely watertight.
   b. No drain plug or drain openings shall be insulated.
   c. Any protrusions through pipe insulation such as instrumentation connections, uninsulated pipe connections, supports or electrical tracing cables shall be carefully sealed for the appropriate service.
   d. Certain smaller piping systems (or smaller sized pipe runs) are only shown diagrammatically, or may be specified to terminate at a certain point not shown physically on the drawings. Contractor shall furnish and install insulation for such piping in order to complete the system whether physically shown or not.
   e. Insulation, three (3) inches and over in total thickness shall be applied in two layers with staggered joints unless otherwise specifically approved.

f. All projecting hanger lugs on piping for working temperatures of 300°F and above shall be properly covered with insulation to maintain an outside surface temperature of not more than 175°F.

g. The Contractor shall weld clip angles, studs, etc. to vertical runs of pipe as may be required to properly support the insulation. Submit welding procedures to the Owner's representative for review prior to welding.

h. The Contractor shall provide necessary flashings, sleeves, boots, clamps, sealants, etc. for roof, floor and wall penetrations requiring a watertight or weathertight seal. Submit details to the Owner's representative for review prior to installation.

3.10 PIPING IDENTIFICATION

A. Identify piping and direction of flow so piping can be painted and labeled in accordance with Section 09800, Painting and Special Coatings.

3.11 DIELECTRONICS

A. Use dielectric unions at the junction of all dissimilar piping. Gasket material shall be No. 5, Steam.

3.12 CLEAN-UP

A. All surfaces required to be painted shall be cleaned and degreased.

B. Remove all debris, tools, scaffolding, trash and excess materials from the site.

3.13 TESTING

A. All process plant piping shall be tested in accordance with Section 01661, Testing & Inspection of Pipeline Construction.

B. The Contractor shall notify the Owner's representative prior to all pipe testing.

- END OF SECTION –

TABLE A

PIPE SIZE	DESIGN WEIGHT	ROD SIZE BASED ON SINGLE ROD SEE NOTE 1	MAXIMUM SPAN, IN FEET FOR PIPES NOT IN RACKS SEE NOTE 2.			
			STEEL	COPPER	PLASTIC See note 3.	CAST IRON See note 4.
3/8" to 3/4"	275 LBS	3/8"	5	5	CONTINUOUS	--
1"	275 LBS	3/8"	7	6	5	--
1-1/4"	300 LBS	3/8"	7	7	5	--
1-1/2"	300 LBS	3/8"	9	8	5	--
2"	325 LBS	3/8"	10	8	4	PRESSURE
2-1/2"	375 LBS	1/2"	10	9	6	PIPE 12 FT
3"	575 LBS	1/2"	10	10	7	SOIL PIPE
4"	600 LBS	5/8"	10	10	7	10 FT
6"	750 LBS	3/4"	10	10	9	--
8"	950 LBS	7/8"	10	10	9	--
10"	1200 LBS	7/8"	10	--	--	--
12"	1450 LBS	7/8"	10	--	--	--

NOTES:

1. Rod size is based on carrying single pipe. When more than one pipe is to be supported, rods shall be sized using design weights to determine total load.
2. Where modularly spaced inserts are required. Pipes shall be supported at the insert module no special inserts shall be allowed for individual pipe supports unless specifically detailed or authorized by the engineer.
3. Spacing based on schedule 80 at 100°F. Schedule 40 or higher temperatures require shortened spans. See mfr's recommendations.
4. There shall be at least one hanger per pipe length located as close to the bell as possible.
5. See typical support rod, DWG M3, for pipes subject to horizontal movement (service temperatures 33° - 55°F and 120° - 450°F).
6. Use turnbuckle, WSS Type 13, for PA-3 and PA-7.
7. Design weights refer to the pipe size shown supported at the spacing listed and shall be used for design of all special hanger systems.

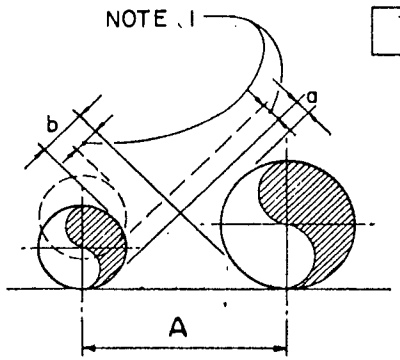
TABLE B

SERVICE CONDITION	PIPE ATTACHMENTS "X" INDICATES PIPE ATTACHMENTS SUITABLE FOR CONDITIONS LISTED IN SERVICE CONDITIONS COLUMN															
SERVICE TEMPERATURE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
33°- 55°F } Insulated or				X	X	X	X	X	X			X		X		X
120°- } Uninsulated	X	X	X	X	X		X	X	X	X	X	X	X	X		X
450°F Uninsulated	X	X		X	X					X	X		X	X	X	X
60°- 115°F																
PIPING MATERIALS																
STEEL	X	X	X	X	X	X		X	X	X	X	X	X	X		X
COPPER		X					X	X	X	X	X	X	X			
PLASTIC	X	X								X	X		X			X
CAST IRON	X	X	X					X	X	X	X	X	X		X	X

NOTES:

1. Asterisk indicates pipe attachments that require special treatment when used with copper pipe. Refer to individual details above.
2. For service other than those shown in Table B, pipe attachments shall be as selected by the engineer.

PIPE SPACING SCHEDULE



A $\frac{a}{b}$ KEY

A STANDARD LINE SPACING

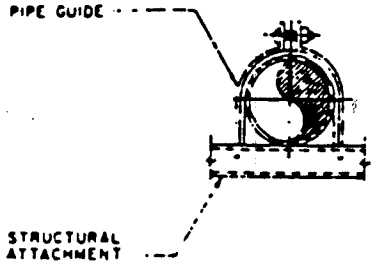
a CLEARANCE FOR SMALL LINE OVER LARGE LINE OR LARGE LINE UNDER SMALL LINE

b CLEARANCE FOR LARGE LINE OVER SMALL LINE OR SMALL LINE UNDER LARGE LINE

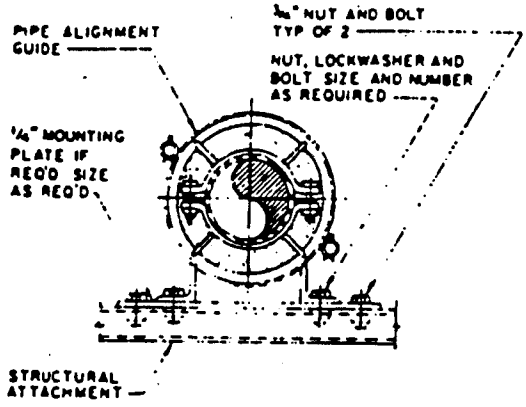
NOTES

1. IF ONE LINE IS ON GUIDES, CLEARANCE WILL INCREASE OR DECREASE BY 0.707 TIMES HEIGHT OF GUIDE.
2. NO NUMBER AT a OR b INDICATES NO CLEARANCE IN THAT DIRECTION.
3. FLANGES MUST BE STAGGERED.
4. ADD 1.41 TIMES INSULATION THICKNESS FOR INSULATED PIPE.

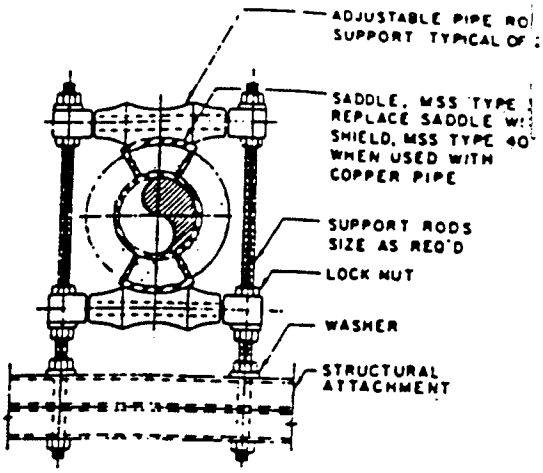
SIZE	1"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
1"	4 $\frac{1.51}{1.51}$												
2"	5 $\frac{1.32}{2.06}$	5 $\frac{1.16}{1.16}$											
3"	6 $\frac{1.06}{2.61}$	6 $\frac{0.91}{1.70}$	7 $\frac{1.45}{1.45}$										
4"	6 $\frac{2.08}{2.46}$	7 $\frac{0.76}{2.26}$	8 $\frac{1.30}{2.01}$	8 $\frac{1.15}{1.15}$									
6"	8 $\frac{-}{3.56}$	8 $\frac{-}{2.66}$	9 $\frac{0.20}{2.41}$	9 $\frac{0.05}{1.55}$	10 $\frac{0.45}{0.45}$								
8"	9 $\frac{-}{3.98}$	9 $\frac{-}{3.07}$	10 $\frac{-}{2.82}$	10 $\frac{-}{1.97}$	12 $\frac{0.02}{1.57}$	13 $\frac{0.57}{0.57}$							
10"	10 $\frac{-}{4.37}$	11 $\frac{-}{4.17}$	11 $\frac{-}{3.21}$	12 $\frac{-}{3.07}$	13 $\frac{-}{1.96}$	14 $\frac{-}{0.96}$	15 $\frac{-}{-}$						
12"	12 $\frac{-}{5.50}$	12 $\frac{-}{4.59}$	13 $\frac{-}{4.33}$	13 $\frac{-}{3.48}$	14 $\frac{-}{2.38}$	15 $\frac{-}{0.14}$	16 $\frac{-}{0.03}$	17 $\frac{-}{-}$					
14"	14 $\frac{-}{6.72}$	14 $\frac{-}{5.82}$	15 $\frac{-}{5.57}$	15 $\frac{-}{4.71}$	16 $\frac{-}{3.61}$	17 $\frac{-}{2.61}$	18 $\frac{-}{1.50}$	19 $\frac{-}{0.50}$	20 $\frac{0.14}{0.14}$				
16"	15 $\frac{-}{7.14}$	15 $\frac{-}{6.24}$	16 $\frac{-}{5.98}$	16 $\frac{-}{5.13}$	17 $\frac{-}{4.03}$	18 $\frac{-}{3.02}$	19 $\frac{-}{1.91}$	20 $\frac{-}{0.92}$	21 $\frac{-}{0.56}$	22 $\frac{-}{-}$			
18"	16 $\frac{-}{7.55}$	16 $\frac{-}{6.65}$	17 $\frac{-}{6.39}$	17 $\frac{-}{5.54}$	18 $\frac{-}{4.44}$	19 $\frac{-}{3.44}$	20 $\frac{-}{2.33}$	21 $\frac{-}{1.33}$	22 $\frac{-}{0.97}$	23 $\frac{-}{-}$	24 $\frac{-}{-}$		
20"	17 $\frac{-}{7.96}$	17 $\frac{-}{7.06}$	18 $\frac{-}{6.80}$	18 $\frac{-}{5.95}$	19 $\frac{-}{4.85}$	20 $\frac{-}{3.85}$	21 $\frac{-}{2.74}$	22 $\frac{-}{1.74}$	23 $\frac{-}{1.38}$	24 $\frac{-}{0.38}$	25 $\frac{-}{-}$	26 $\frac{-}{-}$	
24"	19 $\frac{-}{8.80}$	19 $\frac{-}{7.90}$	20 $\frac{-}{7.64}$	21 $\frac{-}{7.49}$	22 $\frac{-}{6.39}$	23 $\frac{-}{5.39}$	24 $\frac{-}{4.28}$	25 $\frac{-}{3.28}$	26 $\frac{-}{2.92}$	27 $\frac{-}{1.92}$	28 $\frac{-}{0.92}$	29 $\frac{-}{-}$	31 $\frac{-}{-}$



PG-I



PG-II



PG-III

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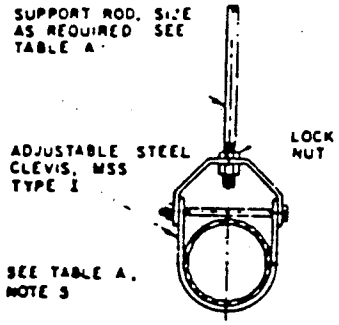
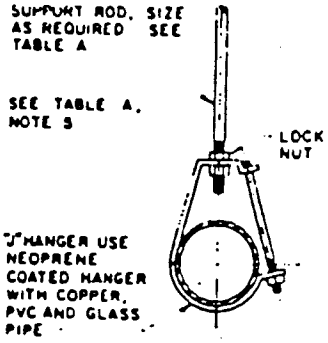


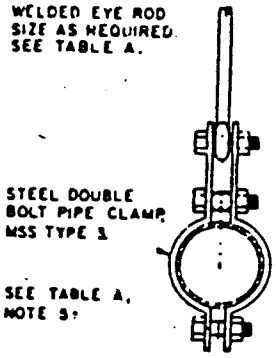
PA-1

1/2" THROUGH 12" PIPE



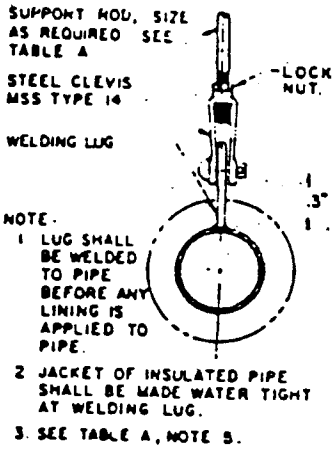
PA-2

1/2" THROUGH 8" PIPE



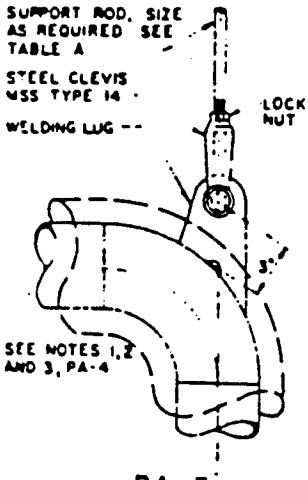
PA-3

3/4" THROUGH 12" PIPE



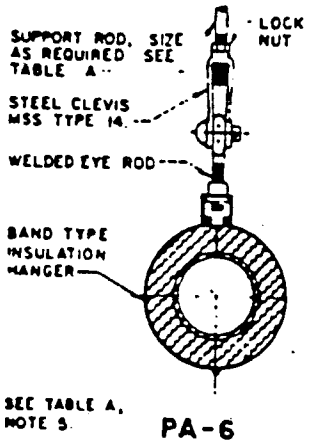
PA-4

2-1/2" THROUGH 12" PIPE



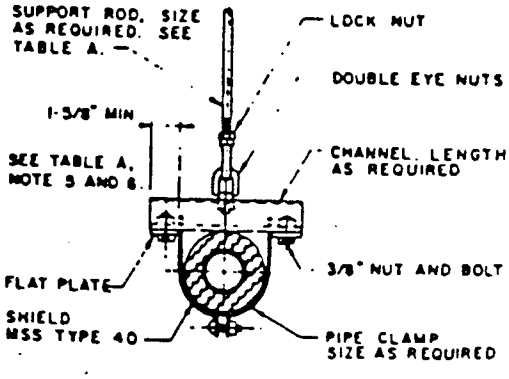
PA-5

2-1/2" THROUGH 12" PIPE



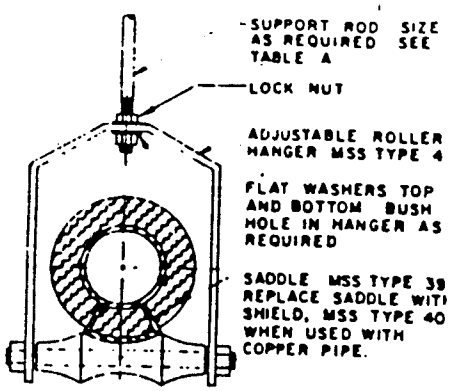
PA-6

1/2" THROUGH 12" PIPE



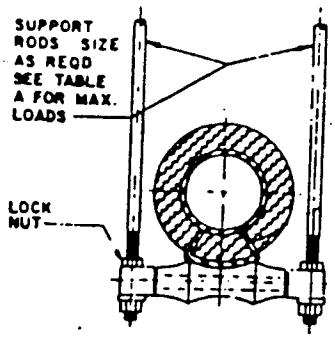
PA-7

3/8" THROUGH 3" PIPE



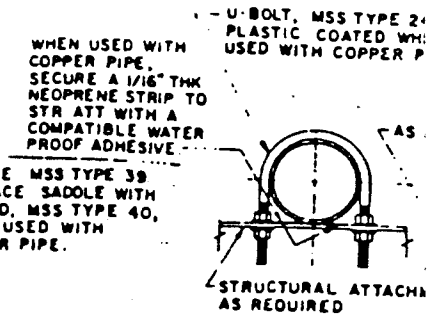
PA-8

3/8" THROUGH 12" PIPE



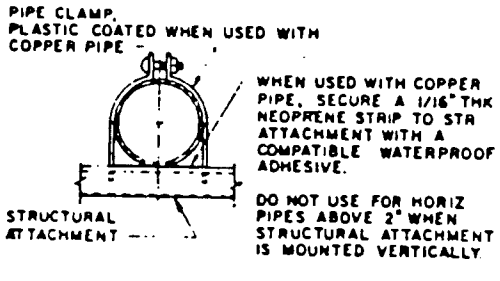
PA-9

3/8" THROUGH 12" PIPE



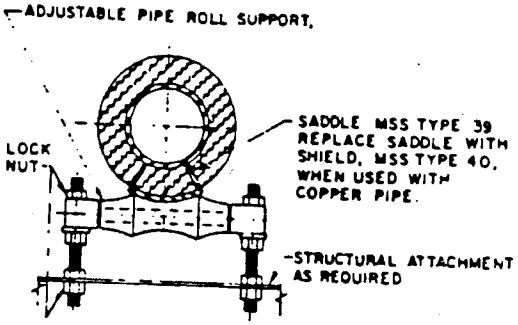
PA-10

1/2" THROUGH 12" PIPE



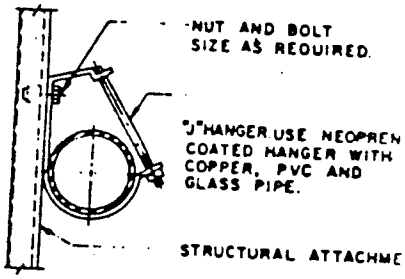
PA-11

3/8" THROUGH 8" PIPE



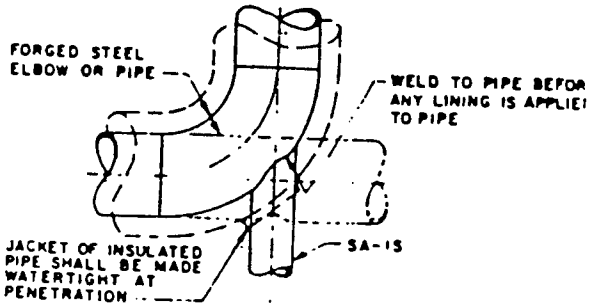
PA-12

3/8" THROUGH 12" PIPE



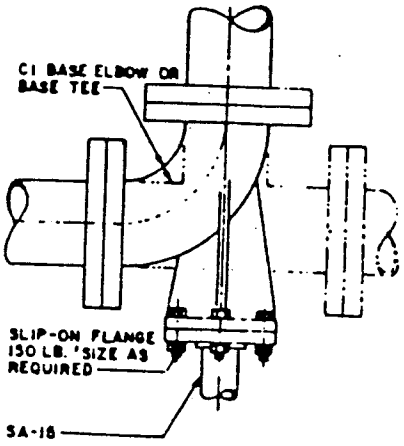
PA-13

1/2" THROUGH 8" PIPE



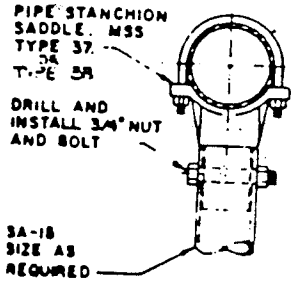
PA-14

2-1/2" THROUGH 12" PIPE



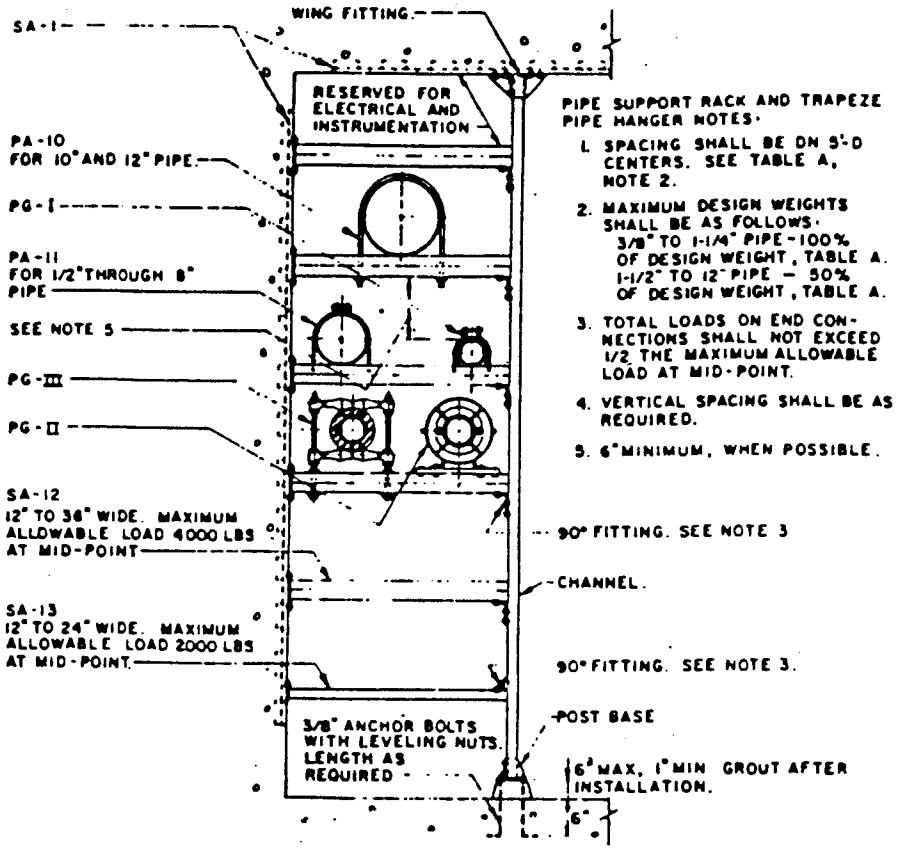
PA-15

2-1/2" THROUGH 12" PIPE

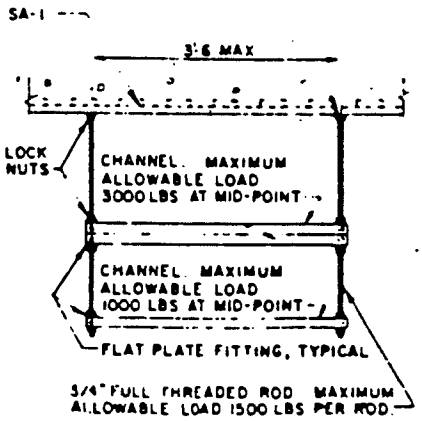


PA-16

4" THROUGH 12" PIPE



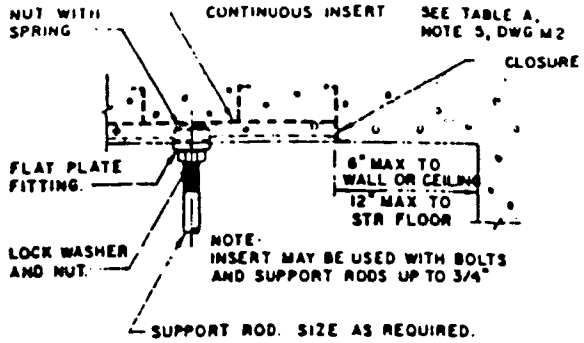
TYPICAL PIPE SUPPORT RACK



TYPICAL TRAPEZE PIPE HANGER

NOTES:

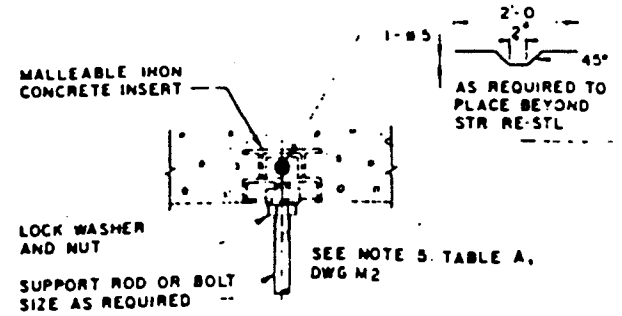
1. PIPE SUPPORT SYSTEMS ARE IDENTIFIED ON THE DRAWINGS AS FOLLOWS:
2. MSS REFERS TO MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTING INDUSTRY, STANDARD PRACTICE SP 58 AND SP 69.
3. FITTINGS SHALL NOT BE LESS THAN MSS CL 8
4. ALL STRUCTURAL AND PIPE ATTACHMENTS, PIPE SUPPORT RACK AND TRAPEZE PIPE HANGER COMPONENTS SHALL BE HOT DIP GALVANIZED AFTER FABRICATION
5. WHERE NO REFERENCE TO PIPE SUPPORT SYSTEMS IS GIVEN ON THE DRAWINGS, THE CONTRACTOR SHALL USE AN APPROPRIATE SYSTEM AS DIRECTED BY THE ENGINEER SEE TABLE B.



CAPACITY: 3/8" THROUGH 12" PIPE. (8" THROUGH 12" MUST BE SUPPORTED WITH 3/4" RODS) LOAD SHALL NOT EXCEED 1500 LBS/FOOT OF INSERT LENGTH. USE DESIGN WEIGHTS SHOWN IN TABLE A, DWG M2 TO DETERMINE TOTAL LOAD.

SPACING: INSERTS SHALL BE INSTALLED ON 5'-0 CENTERS IN WALLS AND CEILINGS OF TUNNELS, GALLERIES AND ROOMS BELOW GRADE WHERE INDICATED ON DETAIL DRAWINGS. IF SPACING OTHER THAN 5'-0 IS REQUIRED, IT WILL BE SO INDICATED ON DRAWING.

SA-1

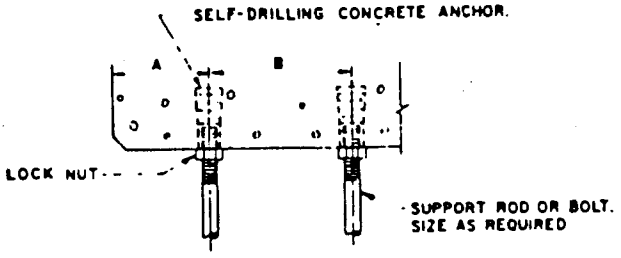


CAPACITY: 3/8" THROUGH 12" PIPE.
MAXIMUM ALLOWABLE LOAD:

3/8" ROD	610 LBS
1/2" ROD	1130 LBS
5/8"-7/8" RODS	1430 LBS

SPACING SHALL BE AS REQUIRED BUT NOT TO EXCEED THOSE SPANS SHOWN IN TABLE A, DWG M2.

SA-2



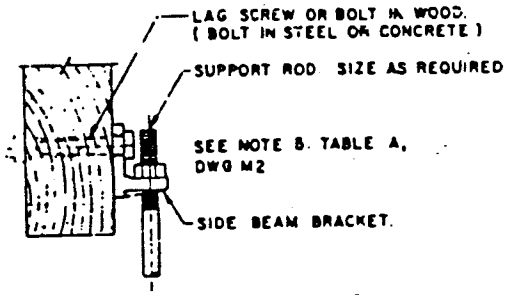
CAPACITY: 3/8" THROUGH 12" PIPE.
MAXIMUM ALLOWABLE LOAD:

3/8" ROD	610 LBS
1/2" ROD	1130 LBS
5/8" ROD	1810 LBS
3/4" ROD	2350 LBS
7/8" ROD	2630 LBS

SPACING SHALL BE AS REQUIRED BUT NOT TO EXCEED THOSE SPANS SHOWN IN TABLE A, DWG M2

MINIMUM SPACING	A-EDGE DISTANCE,	B-CENTER TO CENTER
3/8" ROD	3"	4"
1/2" ROD	4"	5"
5/8" ROD	4"	6"
3/4" ROD	5"	7"
7/8" ROD	6"	8"

SA-3

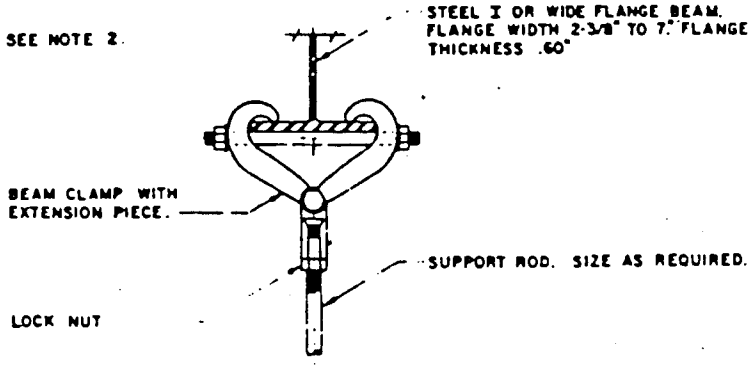


CAPACITY: WOOD 3/8" THROUGH 8" PIPE
STEEL OR CONCRETE 3/8" THROUGH 12" PIPE
MAXIMUM ALLOWABLE LOAD:

	WOOD	CONCRETE / STEEL
3/8" ROD	390 LBS	610 LBS
1/2" ROD	640 LBS	1130 LBS
5/8" ROD	760 LBS	1810 LBS
3/4" ROD	830 LBS	2710 LBS
7/8" ROD	630 LBS	3770 LBS

SPACING SHALL BE AS REQUIRED BUT NOT TO EXCEED THOSE SPANS SHOWN IN TABLE A, DWG M2

SA-4

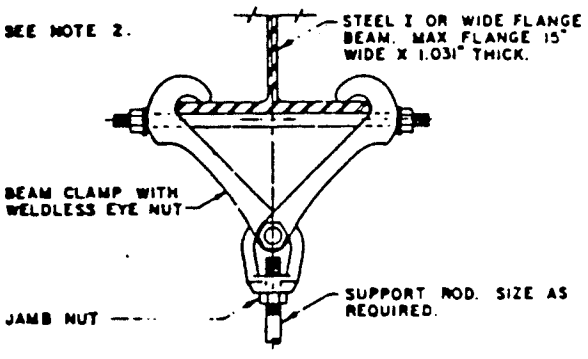


CAPACITY: 3/8" THROUGH 10" PIPE.
MAXIMUM ALLOWABLE LOAD:

3/8" ROD	610 LBS
1/2" ROD	1130 LBS
5/8"-7/8" RODS	1365 LBS

SPACING SHALL BE AS REQUIRED BUT NOT TO EXCEED THOSE SPANS SHOWN IN TABLE A, DWG M2

SA-5

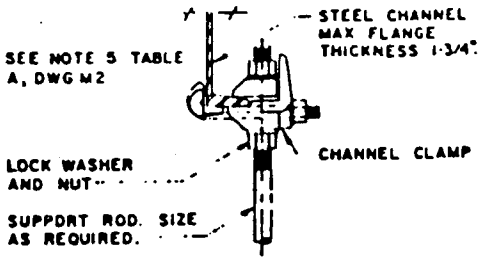


CAPACITY: 3/8" THROUGH 12" PIPE
MAXIMUM ALLOWABLE LOAD:

3/8" ROD	610 LBS
1/2" ROD	1130 LBS
5/8" ROD	1810 LBS
3/4" ROD	2710 LBS
7/8" ROD	3770 LBS

SPACING SHALL BE AS REQUIRED BUT NOT TO EXCEED THOSE SPANS SHOWN IN TABLE A, DWG M2.

SA-6

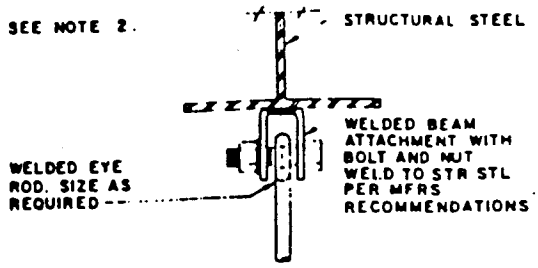


CAPACITY : 3/8" THROUGH 12" PIPE.
MAXIMUM ALLOWABLE LOAD:

3/8" ROD	JAW 1	460 LBS
1/2" ROD	JAW 2	460 LBS
5/8" ROD	JAW 3	780 LBS
3/4" ROD	JAW 4	1400 LBS
7/8" ROD	JAW 5	1740 LBS

SPACING SHALL BE AS REQUIRED BUT NOT TO EXCEED THOSE SPANS SHOWN IN TABLE A, DWG M2.

SA-7

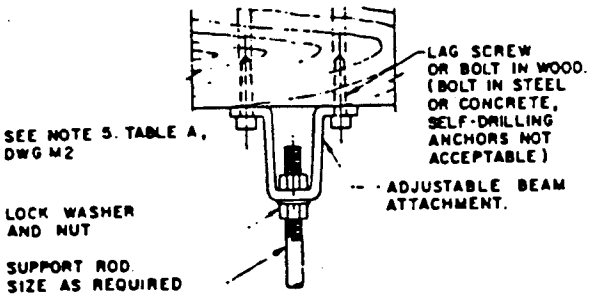


CAPACITY : 3/8" THROUGH 12" PIPE
MAXIMUM ALLOWABLE LOAD:

3/8" ROD	610 LBS
1/2" ROD	1130 LBS
5/8" ROD	1810 LBS
3/4" ROD	2710 LBS
7/8" ROD	3770 LBS

SPACING SHALL BE AS REQUIRED BUT NOT TO EXCEED THOSE SPANS SHOWN IN TABLE A, DWG M2

SA-8

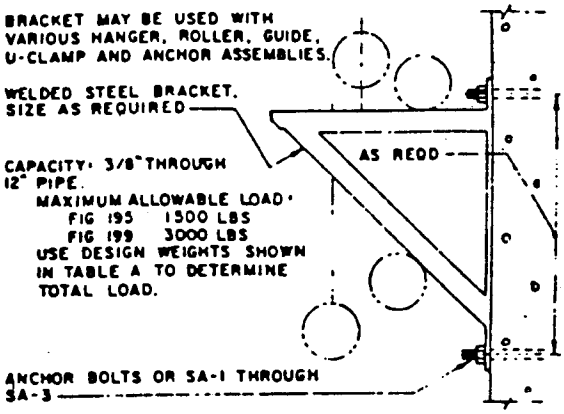


CAPACITY : 3/8" THROUGH 12" PIPE.
MAXIMUM ALLOWABLE LOAD:

	WOOD	CONCRETE/STEEL
3/8" ROD	425 LBS	610 LBS
1/2" ROD	715 LBS	1130 LBS
5/8" ROD	810 LBS	1810 LBS
3/4" ROD	1500 LBS	2710 LBS
7/8" ROD	1650 LBS	3770 LBS

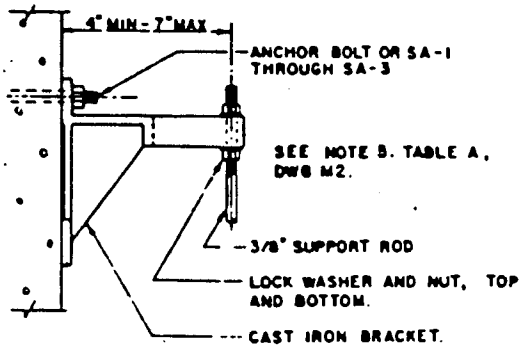
SPACING SHALL BE AS REQUIRED BUT NOT TO EXCEED THOSE SPANS SHOWN IN TABLE A, DWG M2.

SA-9



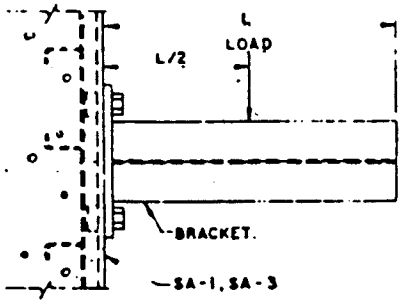
SPACING SHALL BE AS REQUIRED BUT NOT EXCEED THOSE SPANS SHOWN IN TABLE A, DWG M2

SA-10



CAPACITY: 3/8" THROUGH 2" PIPE
MAXIMUM ALLOWABLE LOAD: 180 LBS

SA-11



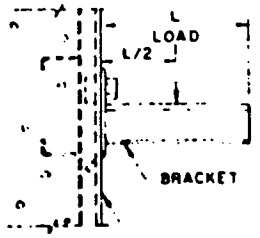
BRACKET MAY BE USED WITH VARIOUS HANGER, ROLLER, GUIDE AND CLAMP ASSEMBLIES.

CAPACITY AT MID-POINT:

L	LOAD
12"	2000 LBS
18"	1300 LBS
24"	1000 LBS
30"	800 LBS
36"	650 LBS

SPACING SHALL BE AS REQUIRED BUT NOT TO EXCEED THOSE SPANS SHOWN IN TABLE A, DWG M2.

SA-12



SA-1

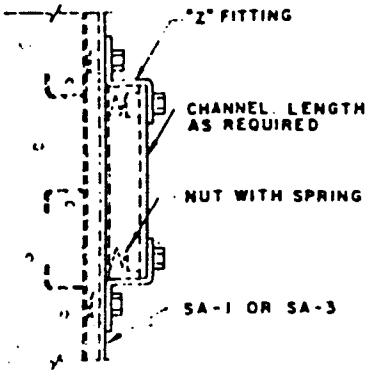
BRACKET MAY BE USED WITH VARIOUS HANGER, ROLLER, GUIDE AND CLAMP ASSEMBLIES

CAPACITY AT MID-POINT

L	LOAD
6"	1200 LBS
12"	600 LBS
18"	400 LBS
24"	300 LBS

SPACING SHALL BE AS REQUIRED BUT NOT TO EXCEED THOSE SPANS SHOWN IN TABLE A, DWG M2.

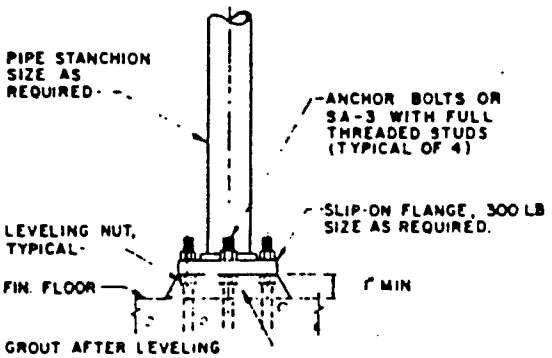
SA-13



CAPACITY - 3/8" THROUGH 8" PIPE

SPACING SHALL BE AS REQUIRED BUT NOT TO EXCEED THOSE SPANS SHOWN IN TABLE A, DWG M2

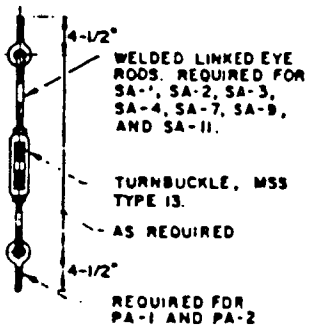
SA-14



CAPACITY - 2-1/2" THROUGH 12" PIPE

SPACING SHALL BE AS REQUIRED BUT NOT TO EXCEED THOSE SPANS SHOWN IN TABLE A, DWG M2.

SA-15



TYPICAL SUPPORT ROD FOR PIPES SUBJECT TO HORIZONTAL MOVEMENT.

SEE NOTE 5 TABLE A, DWG M2

GENERAL NOTES:

1. LOADS FOR SIZING ALL COMPONENTS SHALL BE DETERMINED USING THE DESIGN LOADS SHOWN IN TABLE A, DRAWING
2. WHEN SUPPORTING PIPING REQUIRING HORIZONTAL FLEXIBILITY NORMAL TO THE BEAM'S AXIS, USE SA-5 AND SA-6. SA-8 SHALL BE USED FOR PARALLEL FLEXIBILITY.
3. ALL COMPONENTS OF STRUCT ATTACHMENTS SHALL BE STAINLESS STEEL

PIPING SYSTEM SPECIFICATION

CHLORINE SOLUTION.....1

CHLORINE VACUUM.....2

ENGINE EXHAUST.....3

EQUIPMENT VENT.....4

HOT WATER AND TEMPERED WATER.....5

NATURAL GAS.....6

POTABLE WATER.....7

SAMPLE.....8

SANITARY DRAIN AND VENT.....9

PIPING SYSTEM SPECIFICATION

SERVICE	SYMBOL
CHLORINE SOLUTION	**CLS**

FLUID	TEST MEDIUM
CHLORINE & WATER	☐ AIR ☒ WATER ☐ ____
	TEST DURATION 60 MIN.

PRESSURE – PSIG			TEMPERATURE °F	
WORK	MAX	TEST	NORMAL	MAX
75	100	125	70	85

PIPE AND FITTING SPECIFICATION

PIPE SIZE	EXPOSURE	PIPE	FITTINGS
4" & Smaller	EXPOSED	Rigid polyvinyl chloride, NSF, SCH 80, low temperature insulation	Rigid polyvinyl chloride Socket type, NSF, SCH 80, low temperature insulation
	BURIED EMBEDDED ENCASED	Rigid polyvinyl chloride, NSF, SCH 80, with tracer tape	Rigid polyvinyl chloride socket type, NSF, SCH 80
	EXPOSED BURIED EMBEDDED ENCASED		

VALVE SPECIFICATION

SIZE	EXPOSURE	TYPE	SPECIFICATION
2" & Smaller	Exposed	Isolating	Ball
		Throttling	Diaphragm: PVC Body, Neoprene Diaphragm, Socket Type
			Grinnel 2451, Hills McCanna or equal
		Check	Ball
2½"-4"	Exposed	Isolating	Ball
		Throttling	Diaphragm: PVC lined, Neoprene Diaphragm, Flanged
			Grinnel 2536, Hills McCanna or equal
		Check	Ball

REMARKS:

PIPING SYSTEM SPECIFICATION

SERVICE	SYMBOL
CHLORINE VACUUM	**CLV**

FLUID	TEST MEDIUM
GAS UNDER PRESSURE	☒ AIR ☐ WATER ☐ _____
	TEST DURATION 15 MIN.

VACUUM INCHES OF WATER COLUMN			TEMPERATURE °F	
WORK	**MAX**	**TEST**	**NORMAL**	**MAX**
-18 TO -20"	30"	30"	70	90

PIPE AND FITTING SPECIFICATION

PIPE SIZE	EXPOSURE	PIPE	FITTINGS
4" & Smaller	EXPOSED BURIED EMBEDDED ENCASED	Rigid polyvinyl chloride, NSF, SCH 80,	Rigid polyvinyl chloride socket Type, NSF, SCH 80,
	EXPOSED BURIED EMBEDDED ENCASED		

VALVE SPECIFICATION

SIZE	EXPOSURE	TYPE	SPECIFICATION
4" & Smaller	Exposed	Isolating	Ball
		Check	Ball

REMARKS:

PIPING SYSTEM SPECIFICATION

SERVICE	SYMBOL
ENGINE EXHAUST	EE

FLUID	TEST MEDIUM
HOT GASES	☒ AIR ☐ WATER ☐ ____
	TEST DURATION 60 MIN.

PRESSURE – PSIG			TEMPERATURE °F	
WORK	**MAX**	**TEST**	**NORMAL**	**MAX**
			800	1200

PIPE AND FITTING SPECIFICATION

PIPE SIZE	EXPOSURE	PIPE	FITTINGS
All	EXPOSED BURIED EMBEDDED ENCASED	Steel, SCH 80, black seamless with butt weld joints and high temperature insulation	Steel, ANSI B16.9, extra strong with butt weld joints and high temperature insulation
	EXPOSED BURIED EMBEDDED ENCASED		

VALVE SPECIFICATION

SIZE	EXPOSURE	TYPE	SPECIFICATION

REMARKS: Use long radius bends. Do not insulate flexible connection.

PIPING SYSTEM SPECIFICATION

SERVICE	SYMBOL
EQUIPMENT VENT	EV

FLUID	TEST MEDIUM
WASTEWATER & SLUDGE	☐ AIR ☒ WATER ☐ ____
	TEST DURATION 60 MIN.

PRESSURE – PSIG			TEMPERATURE °F	
WORK	MAX	TEST	NORMAL	MAX
5	10	30	60	75

PIPE AND FITTING SPECIFICATION

PIPE SIZE	EXPOSURE	PIPE	FITTINGS
3" & Smaller	EXPOSED	Stainless steel, screwed or welded joints	Stainless steel, screwed or welded
	BURIED EMBEDDED ENCASED	Polyethelene, heat fused	Polyethelene, heat fused
4" - 12"	EXPOSED	Ductile iron, flanged or grooved pipe couplings	Ductile iron, flanged or grooved
	BURIED EMBEDDED ENCASED	Ductile iron, with mechanical joints and polyethylene encasement	Ductile iron, mechanical joints and polyethylene encasement

VALVE SPECIFICATION

SIZE	EXPOSURE	TYPE	SPECIFICATION
3" & Smaller	Exposed	Isolating	Eccentric Plug
		Throttling	Eccentric Plug
		Check	Swing
4" & Larger	Exposed	Isolating	Eccentric Plug
		Throttling	Eccentric Plug
		Check	Swing Flex
	Buried	Isolating	Eccentric Plug

REMARKS: Buried valves shall have Clow F2450, Dresser or equal three piece valve box

PIPING SYSTEM SPECIFICATION

SERVICE	SYMBOL
HOT WATER AND TEMPERED WATER	**HW, TW**

FLUID	TEST MEDIUM
WATER	☐ AIR ☒ WATER ☐ _____
	TEST DURATION 60 MIN.

PRESSURE – PSIG			TEMPERATURE °F	
WORK	**MAX**	**TEST**	**NORMAL**	**MAX**
75	100	125	140	200

PIPE AND FITTING SPECIFICATION

PIPE SIZE	EXPOSURE	PIPE	FITTINGS
3" & Smaller	EXPOSED	Copper tube, Type L, insulated, medium temperature insulation	Wrot copper, solder joint, insulated, medium temperature insulation
	BURIED EMBEDDED ENCASED	Copper tube, Type K, with compression coupling	Brass compression fittings
	EXPOSED		
	BURIED EMBEDDED ENCASED		

VALVE SPECIFICATION

SIZE	EXPOSURE	TYPE	SPECIFICATION
3" & Larger		Isolating	Gate
		Throttling	Globe
		Check	Lift

REMARKS:

PIPING SYSTEM SPECIFICATION

SERVICE	SYMBOL
NATURAL GAS	**LP**

FLUID	TEST MEDIUM
LIQUIFIED PETROLEUM	☐ AIR ☐ WATER ☒ CO_2
	TEST DURATION 60 MIN.

PRESSURE – PSIG			TEMPERATURE °F	
WORK	**MAX**	**TEST**	**NORMAL**	**MAX**
0.5 to 80	100	150	70	85

PIPE AND FITTING SPECIFICATION

PIPE SIZE	EXPOSURE	PIPE	FITTINGS
3" & Smaller	EXPOSED	Steel, ASTM A120, SCH 40, black, with threaded couplings	300# malleable iron, ANSI B16.3, screwed and banded
	BURIED EMBEDDED ENCASED	Steel, ASTM A120, SCH 40, with threaded couplings and extruded polyethylene coating	300# malleable iron, ANSI B16.3, screwed and banded with extruded polyethylene coating
4" - 12"	EXPOSED	Steel, ASTM A120, SCH 40, black with butt weld joints	Steel, ANSI B16.9, standard weight, with butt weld joints
	BURIED EMBEDDED ENCASED	Steel, ASTM A120, SCH 40, with butt weld joints and extruded polyethylene coating	Steel, ANSI B16.9, standard weight with butt weld joints and extruded polyethylene coating

VALVE SPECIFICATION

SIZE	EXPOSURE	TYPE	SPECIFICATION
All	EXPOSED	Isolating	Lubricated Plug:Cast Steel Rockwell 1925, 1989, Walworth, or equal

REMARKS:

PIPING SYSTEM SPECIFICATION

SERVICE	SYMBOL
POTABLE WATER	**CW**

FLUID	TEST MEDIUM
COLD WATER	☐ AIR ☒ WATER ☐ ____
	TEST DURATION 120 MIN.

PRESSURE – PSIG			TEMPERATURE °F	
WORK	MAX	TEST	NORMAL	MAX
75	100	125	50	100

PIPE AND FITTING SPECIFICATION

PIPE SIZE	EXPOSURE	PIPE	FITTINGS
3" & Smaller	EXPOSED	Copper Tube, Type L, hard temper insulated, low temperature insulation	Wrot copper, solder joint, insulated, low temperature insulation
	BURIED EMBEDDED ENCASED	Copper Tube, Type K, soft temper with compression coupling	Brass compression
4" - 12"	EXPOSED	Ductile Iron, with flanged or grooved pipe couplings, low temperature insulation	Ductile iron, flanged or grooved, low temperature insulation
	BURIED EMBEDDED ENCASED	Ductile iron, with mechanical joints and polyethylene encasement	Ductile iron, mechanical joints and polyethylene encasement
14" - 20"	EXPOSED	Ductile iron, AWWA C151, Class 53	Cast iron, AWWA C110, Class 150
	BURIED	Ductile iron, AWWA C151, Class 52	Cast iron AWWA C110, Class 150
24" - 48"	EXPOSED	Ductile iron, AWWA C151, Class 54	Cast or ductile iron, AWWA C110, Class 150
	BURIED	Ductile iron, AWWA C151, Class 52	Cast or ductile iron, AWWA C110 Class 150

VALVE SPECIFICATION

SIZE	EXPOSURE	TYPE	SPECIFICATION
3" & Smaller	Exposed	Isolating	Gate
		Throttling	Globe
		Check	Swing
4" - 12"	Exposed	Isolating	Gate
		Throttling	Butterfly
		Check	Centerguide Miller 162, APCO, or equal
	Buried	Isolating	Gate
		Throttling	Butterfly
14" - 20"	Exposed	Isolating	Type "W" Butterfly
		Throttling	Type "W" Butterfly
		Check	Center Guide, Class 125
	Buried	Isolating	Type "W" Butterfly
		Throttling	--
24" - 48"	Exposed	Isolating	Type "W" Butterfly
		Throttling	Type "W" Butterfly
	Buried	Isolating	Type "W" Butterfly
		Throttling	--

REMARKS: Buried valves to have Clow F2450, Kennedy, or equal 3 piece valve box.

PIPING SYSTEM SPECIFICATION

SERVICE	SYMBOL
SAMPLE	SMI, SME

FLUID	TEST MEDIUM
WASTEWATER	☒ AIR ☐ WATER ☐ _____
	TEST DURATION 15 MIN.

PRESSURE – PSIG –SEE COMMENTS**			TEMPERATURE °F	
WORK	MAX	TEST	NORMAL	MAX
**	**	**	70	90

PIPE AND FITTING SPECIFICATION

PIPE SIZE	EXPOSURE	PIPE	FITTINGS
4" & Smaller	EXPOSED	Industrial grade PVC tubing in rigid polyvinyl chloride, NSF, SCH 40 carrier pipe,. no joints in tubing	Rigid polyvinyl chloride socket Type, NSF, SCH 40 for carrier pipe, no fittings in tubing
	BURIED EMBEDDED ENCASED	Industrial grade PVC tubing in rigid polyvinyl chloride, NSF, SCH 40 carrier pipe , with tracer tape	Rigid polyvinyl chloride socket Type, NSF, SCH 40 for carrier pipe no fittings in tubing
	EXPOSED		

VALVE SPECIFICATION

SIZE	EXPOSURE	TYPE	SPECIFICATION

REMARKS: (*) THIRD LETTER DESIGNATES SERVICE I=INFLUENT E=EFFLUENT
Tubing shall be industrial grade PVC formulation C486-A
durometer (Shore A) = 78+/-5

**	Vacuum	Work	5	Max	8	Test	8
	Pressure	Work	20	Max	30	Test	30

PIPING SYSTEM SPECIFICATION

SERVICE	SYMBOL
SANITARY DRAIN AND VENT	SD, SV

FLUID	TEST MEDIUM
WASTEWATER AND AIR	☐ AIR ☒ WATER ☐ ____
	TEST DURATION 60 MIN.

PRESSURE – PSIG			TEMPERATURE °F	
WORK	MAX	TEST	NORMAL	MAX
		3 PSI		

PIPE AND FITTING SPECIFICATION

PIPE SIZE	EXPOSURE	PIPE	FITTINGS
Less than 1½"	EXPOSED	SCH 40 PVC DWV	SCH 40 PVC DWV, solvent weld
	BURIED EMBEDDED ENCASED		
1½" - 8"	EXPOSED	SCH 40 PVC DWV	SCH 40 PVC, solvent weld
	BURIED EMBEDDED ENCASED	SCH 40 PVC DWV	SCH 40 PVC DWV, solvent weld

VALVE SPECIFICATION

SIZE	EXPOSURE	TYPE	SPECIFICATION

REMARKS:

SECTION 15060

ROOF MOUNTED EQUIPMENT SUPPORTS AND ROOF CURBS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Drawings, General and Supplementary Conditions, and provisions of Division 1 apply to this Section.

B. Refer also to Division 15 "Basic Mechanical Requirements" and "Basic Mechanical Materials and Methods" Sections.

1.02 SUMMARY OF WORK

A. Work of this Section includes roof equipment supports and roof curbs applicable to all Division 15 HVAC Sections

1.03 QUALITY ASSURANCE

A. All roof equipment supports and roof curbs shall be securely fastened to the building construction.

PART 2 - PRODUCTS

2.01 ROOF EQUIPMENT SUPPORTS

A. General: Construct roof equipment supports using 11 gauge aluminum with fully mitered and welded corners, no cant, internal bulkhead reinforcing, integral base plates, pressure treated wood nailer, and 14 gauge aluminum counter flashing.

B. Configuration: Construct to sizes as indicated, compensate for slope in roof so top of support is dead level.

C. Manufacturers: Pate, Roof Products & Systems, Thycurb

2.02 ROOF CURBS

A. Provide prefabricated roof curbs and supports of the types and sizes shown on Plans.

B. Fabricate from 14-gauge aluminum with welded corners and seams, 3 inches minimum mitered integral cant, factory installed wood nailers, and deck flange. Reinforce at 3-foot intervals.

C. Minimum overall height – 14 inches unless noted otherwise.

D. Insulate curbs with 1-1/2 inch 3 lb. density fiberglass board. Provide 3 lb. fiberglass deck insulation where shown.

E. Provide 16-gauge aluminum perforated acoustical liner and internal baffles for curbs where indicated.

F. Provide 14-gauge aluminum counter flashing for equipment supports.

G. Manufacturer: Roof Products & Systems, Pate, Thycurb, or equipment OEM.

PART 3 - EXECUTION

3.01 GENERAL

A. Securely fasten all supports to the building construction with Type 316 stainless steel fasteners.

B. Install supports so as to prevent swaying, allow for expansion and contraction, and maintain required pitch.

- END OF SECTION –

SECTION 15100

VALVES

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: This section includes providing valves in size and type shown on plans and on the Piping System Specification Sheets.

B. Related Sections and Divisions:
1. Applicable provisions of the General Conditions shall govern the work in this section.
2. Section 01300, Submittals.
3. Section 01730, Operational Maintenance Data.
4. Section 02616, Ductile Iron Pipe.
5. Section 02622, PVC Pipe.
6. Section 11000, Installation and Training Checklist.
7. Division 15, Mechanical.
8. Division 16, Electrical.

1.02 REFERENCE STANDARDS

A. American Water Works Association (AWWA):

1.	AWWAC111	Rubber-Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.

B. American Society for Testing and Materials (ASTM):

1.	ASTM A48	Spec. for Gray Iron Castings.
2.	ASTM A126	Spec. for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
3.	ASTM A743	Spec. for Corrosion-Resistant Iron-Chromium, Iron-Chromium Nickel, and Nickel-Base Alloy Castings for General Application.
4.	ASTM A296	Spec. for Stainless Steel, Type 304 or 316.

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01300, submittals:
1. Shop drawings including assembly and installation drawings and materials of construction.
2. Product data including:
   a. Name of manufacturer.
   b. Type and model.
   c. Electrical information.
3. Operation and maintenance manuals.

B. Submit two (2) copies of a report documenting the field testing to the Engineer.

PART 2 - PRODUCTS

2.01 PVC BALL VALVES

A. Valves shall have full part opening with minimal pressure drop.

B. Valve seats shall be replaceable with self-lubricating teflon seats.

C. Valves shall be rated for a minimum 150 psig at 72° F.

D. Valves shall be suitable for intended service.

E. Solvent Weld Double Union Ball Valve
   1. Type: Full port; PVC body, ball and stem; solvent weld socket union-ends; PTFE seats, Viton O-ring seals and tee handle.
   2. Size: ½-inch thru 2-inch.
   3. Manufacturer: Chemtrol, Thermoplastic Valve, or equal.

F. Flanged PVC Ball Valve
   1. Type: Full port; PVC body, ball and stem; flanged ends, PTFE seats; viton O-ring seals and tee handle.
   2. Size: 2½-inch and larger.
   3. Manufacturer: Chemtrol, Thermoplastic Valve, or equal.

G. Valves shall have a full 2-year warranty.

2.02 BRONZE BALL VALVES

A. General Purpose two-piece end entry ball valve.

B. Bronze, Regular Port, Blowout Proof Stem.

C. Manufacturer: Crane Capri, 600 CWP/150 SWP, ¼-inch – 2-inch, 400 CWP/150 SWP, 2½-inch – 3-inch.

2.03 BRONZE GATE VALVES

A. Non-rising stem, screwed bonnet, solid wedge disc.
   1. Manufacturer: Crane Class 150 ¼-inch to 3-inch No. 437 threaded, No. 1324 solder joint.

2.04 GLOBE VALVES

A. Valve size ½-inch to 1½-inch.
   1. Crane Class 150 or equal
   2. Body: B62 Bronze
   3. Disc: PTFE
   4. Bonnet: B 62 Bronze

B. Valve size 2-inch to 10-inch.

1. Crane Class 125 or equal
2. Body: Cast iron, ASTM A126
3. Disc: 2-inch to 6-inch Solid Bronze
   8-inch to 10-inch Iron with bronze facing
4. Bonnet: Cast iron, ASTM A126
5. Bushings: Bronze, Upper and Lower

2.05 BRONZE SWING CHECK VALVES

A. Bronze disc, suitable for horizontal or vertical installation.

B. Manufacturer: Crane Class 150, ¼-inch to 3-inch.

2.06 BRONZE LIFT CHECK VALVES

A. Horizontal lift check valve with PTFE disc.

B. Manufacturer: Crane Class 150: ¼-inch to 2-inch.

2.07 CHECK VALVES

A. Flanged Swing Flex Check Valve.
   1. Acceptable Manufacturer: Sure Flow, Val-Matic, or equal.
   2. Type: Ductile iron body and bolted flange cover, flanged ends. Body material shall conform to ASTM A-126 Class B. Disc shall be viton, steel reinforced. Face to face dimension shall conform to ANSI B16.10. Flanges shall be faced and drilled to ANSI B 16.5 working pressure and temperature shall conform to ANSI B 16.5.
   3. Provide mechanical indicator for valves 4-inch and larger. The indicator shall have continuous contact with the valve disc under all operating conditions.
   4. Size: 3-inch and larger.
   5. Internal body to be epoxy coated.

B. Solvent Weld Double Union Ball Check Valve.
   1. Acceptable Manufacturer: Chemtrol, Thermoplastic Valve, or equal.
   2. Type: Full port; PVC body and ball; solvent weld socket union ends; viton O-ring seals.
   3. Size: ½-inch through 4-inch.
   4. Valves shall require less than 1 psi to open and 3 psi to close.

2.08 PLUG VALVES

A. Acceptable manufacturer shall be Dezurik, Val-Matic, or equal.

B. Type:
   1. Non-lubricated, eccentric type with resilient faced plugs.

C. End Connections:
   1. Flanged valves shall be faced and drilled to the ANSI 125/150 lb. standards.
   2. Mechanical joint ends shall conform to the AWWA Standard C-1 11.
   3. Bell ends shall conform to the AWWA Standard C-100 Class B.
   4. Screwed ends shall conform to the NPT Standard.

D. Port Areas:
   1. Port areas for valves through 20-inch shall be at least 80% of full pipe area.
   2. Port areas for valves 24-inch or larger shall be at least 70% of full port area.
   3. Valves to be rectangular port design.

E. Valve Bodies:
   1. Valve bodies shall be cast iron.
   2. All exposed nuts, bolts, springs, washers, etc. shall be zinc plated.
   3. Plug shall be completely encapsulated with neoprene suitable for use with sewage or sludge.

F. Valve Seats:
   1. Valves shall be furnished with corrosion resistant seats.
   2. Seats shall have a welded overlay of high nickel content on all surfaces containing the piping face.

G. Bearings and Seals:
   1. Valves shall be furnished with replaceable, sleeve-type bearings in the upper and lower journals.
   2. Bearings shall comply with AWWA Standard C507-73, Paragraphs 8.1, 8.3 and 8.4 and with AWWA Standard C504-74 Section 9.
   3. Valves through 20-inch shall have permanently lubricated, stainless steel bearings in the upper and lower plug stem journals, valves 24-inch and larger shall have bronze bearings and stainless steel sleeves in the upper and lower plug stem journals.

H. Actuators for Plug Valves:
   1. Manual valves shall have lever or gear actuators and tee wrenches, extension stems, floor stands, etc., as shown on drawings.
   2. All buried plug valves (10-inch and larger) shall have gear actuators.
      a. All gearing shall be enclosed in a semi-steel housing and be suitable for running in a lubricant with seals provided on all shafts to prevent entry of dirt and water into the actuator.
      b. The actuator shaft and the position indicator shall be supported on permanently lubricated bronze bearings.
      c. Actuators shall indicate valve position and an adjustable stop shall be provided to set closing torque.
      d. All exposed nuts, bolts, and washers shall be zinc plated.
   3. Valve and gear actuators for buried or submerged service shall have seals on all shafts and gaskets on the valve and actuator cover to prevent the entry of water.
      a. Actuator mounting brackets for buried or submerged service shall be totally enclosed and shall have gasket seals.
      b. All exposed nuts, bolts, springs and washers shall be stainless steel.
      4. All valves with centerline greater than 7 feet above opening floor shall be provided with chain wheel and gear actuator.
         a. Provide chainwheels with guides and chain having proof coil design.
         b. Galvanize chain wheel, levers, guides and chain.
         c. Extend chain to within 3 feet of operating floor.
         d. Provide chain hooks and tie back anchors for chain.

5. Valve shaft seals shall conform to ANSI/AWWA C504 and consist of V-type packing in a fixed gland with an adjustable follower designed to prevent over compression of the packing. Removable, slotted shims shall be provided under the follower flanges to provide for adjustment and prevent over tightening.
6. Both the packing and bearings in the upper and lower journals shall be protected by a shaft seal located on the valve shaft to minimize the entrance of material into the bearing journal and shaft seal areas.

I. Pressure Ratings:
1. Valve pressure ratings shall be established by hydrostatic tests as specified by ANSI Standard B16-1-1967.
2. Pressure ratings shall be:
   a. 125 psi for valves through 12-inch diameter.
   b. 150 psi for valves 14-inch through 36-inch diameter.
   c. 125 psi for valves 42-inch through 54-inch in diameter.
3. Valves shall provide drip tight shut off up to full pressure rating with pressure in either direction.

2.09 BUTTERFLY VALVES

A. Acceptable manufacturer shall be Dezurik, Val-Matic, or equal.

B. Butterfly valves disc and body will thickness shall conform to AWWA C-504.

C. Valve bodies shall be ASTM 126 Class B cast iron. Bodies shall be lug type body style and suitable for use between ANSI 125 or 150 pound flanges.

D. Valves shall be rated at 175 psi and shaft diameter shall conform to 75B standard from AWWA C-504.

E. Lug body valves shall have retained seat and shall provide tight shut off up to the full valve rating on dead end or isolation service without the use of downstream flanges.

F. Discs shall be 316 stainless steel. Disc to shaft connection shall be 316 stainless steel.

G. Shafts shall be supported on self-lubricating bronze or TFE coated stainless steel bearings. Shafts shall be one piece and be of 316 stainless steel.

H. Valve seats shall be of resilient type and shall be field replaceable. Seats shall act as a body liner and provide positive seal without use of flange gaskets.

I. Seating material shall be suitable for use for liquid, gas, or oil for specified pipeline as shown on plan.

J. Valves through 6 inches for balancing service shall have an infinite position lever with adjustable position memory stop. Valves through 6 inches for on-off service shall have a 10 position, latch lock lever.

K. Valves 8 inches and larger shall have enclosed hand wheel or chain wheel operated gear actuators with adjustable open position stop if for balancing service.

2.10 TELESCOPIC VALVES

A. Acceptable manufacturer shall be Latanick, Troy Valve, or equal.

B. Telescopic valves shall be rising stem with self-locking worm gear operator.

C. All material in contact with the wastewater shall be stainless steel.

D. Slip tube shall be Type 304 stainless steel with cast iron mating flange and neoprene seal. The seal shall be replaceable without removal of tube from riser pipe or suspension rod.

E. Floor stand shall be stainless steel with 14-inch diameter aluminum hand wheel.

F. Valve rack shall be steel and covered with a clear acrylic cover with mylar position indicating scale.

G. Slip tube shall be provided with a V-notch or U-notch. Type of notch shall be determined in shop drawings.

2.11 GATE VALVES

A. Acceptable manufacturer shall be U.S. Pipe, American Flow Control, or equal.

B. Gate valves shall be standard iron body, bronze mounted, parallel seat with non-rising stem with solid wedge gates.

C. Valve body shall be ductile iron rated to 250 psi.

D. Design Working Pressure
   1. Valves through 12 inch: 200 psi
   2. Valves larger than 12 inch: 150 psi

E. Valves shall have 125-pound flanges for interior surface and mechanical joint or push-on joint for buried service.

F. Valves not buried shall have hand wheels.

G. Valves for buried service shall have 3-piece valve box with cover for depth as shown on plan. Valves shall have fusion bond epoxy coating inside and out.

H. One valve wrench shall be furnished for maximum depth of bury as shown on plans.

I. Where extension stems, guides, geared, motorized, lever or motorized operators are shown on plan, such operators shall be furnished complete as part of valves.

J. Valves and operators shall conform to AWWA C500.

K. All bolts on the valve exterior for buried valves shall be Type 316 stainless steel.

2.12 KNIFE GATE VALVES

A. Acceptable manufacturer shall be Dezurik, Lined Valve Co., or equal.

B. Valve body shall ductile iron with urethane lining.

C. Knife gate valves shall be bonnetless with rising stem and 125-pound flanges complete with hand wheel or other operator, as shown on plan.

D. Gates shall be 316 stainless steel with resilient seat suitable for municipal sewage or sludge. Working pressure to be 125 lb.

E. Stem to be 304 stainless steel, gate seats body and chest to be 316 stainless steel, gland studs to be cadmium plated. Stem nut to be bronze.

2.13 MUD OR PLUG DRAIN VALVES

A. Acceptable manufacturer shall be Troy Valve, or equal.

B. The mud valve shall be of the heavy duty flanged type designed to provide a positive seal under both seating and unseating head conditions.

C. The valves shall be non-rising stem style.

D. Frame, plug, and yoke shall be case iron (ASTM 126B).

E. Valve operating stem and lift nut shall be bronze (B421).

F. The seat ring shall be bronze (B62) with a tapered, accurately machined seating face.

G. The plug seat shall be seamless molded neoprene tapered to accurately mate with the seat ring for a positive seal.

H. Extension stems, floor stands and stem guides shall be provided as shown on the plans.

2.14 HYDROSTATIC PRESSURE RELIEF VALVES

A. Acceptable manufacturer shall be Troy Valve, Clow, or equal.

B. Relief valves shall be cast iron construction with neoprene seats and face on disc. Valves shall be 6-inch diameter unless shown otherwise on plan.

C. All valves shall be tested at 6-foot head before shipment.

D. Valves shall be wall or floor type as shown on the plans.

2.15 AIR RELEASE VALVE

A. Product
   1. The combination air valve shall fully conform to AWWA C512 and consist of a large orifice and a small orifice housed in a single body. The large orifice shall vent air during the filling of a pipeline or system and automatically close when liquid rises in the valve. The small orifice shall automatically open as often as necessary to release small amounts of accumulated air while the system is pressurized. The large orifice shall re-open to admit air during draining or a negative pressure condition.
   2. The valve shall have NPT inlet and outlet connections. The large orifice diameter shall be no less than the nominal size of the valve and the small orifice shall be suitable for working pressures up to 150 PSI (1,034 KPa) or 300 PSI (2,069 KPa) as shown on the plans, in the valve schedule or the engineer's information.
   3. There shall be an additional plugged NPT connection near the bottom and top for testing and draining.

B. Materials
   1. The valve body and cover shall be rated for 300 PSI (2,069 KPa) and made from cast iron conforming to ASTM A126 Class B.
   2. The float balls, internal trim and linkage mechanism shall be made from Type 316 stainless steel. Non-metallic components are not acceptable.
   3. The seat shall be replaceable and made from Buna-N rubber or other suitable elastomer compounds.
   4. The exterior of the valve shall be shop coated with enamel primer

C. Options
   1. When shown on the plans or in the valve schedule, the valve shall be supplied with and ANSI flanged inlet connection.

D. Manufacturer
   1. Valves shall be Figure 945 as manufactured by GA Industries, LLC, Cranberry Township, PA USA.

2.16 THROTTLING VALVES

A. Wastewater application.
   1. Acceptable manufacturer shall be RKL Controls.
   2. Valve shall be series LHW pinch valve, or equal.
   3. Valve shall be cast iron, fully enclosed, hand wheel operated, 125/150 pound ANSI flanges. Stems and pinch bars shall be 303 cold rolled stainless steel. Valves shall have brass bearings and nylon washes. Grease fittings shall be provided.

2.17 DIAPHRAGM VALVES

A. Acceptable manufacturer shall be Spears, or equal.

B. Valve shall be True Union type, PVC Type I.

C. Valve shall be EPDM O-rings.

D. Valve shall have positive stop stem with built-in position indicator and polypropylene hand wheel.

E. All valve union nuts shall have buttress threads.

F. Pressure rating shall be 235 psi.

G. Size ½-inch – 2-inch.

2.18 NATURAL GAS SYSTEMS

A. Shut Off Valves:
1. 2-inch and smaller: Ball valve, bronze body, threaded ends, stainless steel ball, full or conventional port, Teflon eat, blowout-proof stem, two-piece construction, suitable for 150 psig working pressure, U.L. listed for use as natural gas shut-off.
2. 2½-inch through 4-inch: Cast iron body, flanged ends, bronze bearings, electroless nickel-plated cast iron plug with Hycar resilient plug seal, Buna-N stem seal packing, lever actuator, 175 psi W.O.G., U.L. listed for use as natural gas shut-off.
3. 5-inch and larger: Cast iron body, flanged ends, stainless steel bearings, resilient faced plugs, totally enclosed hand wheel actuators, 175 psi W.O.G., U.L. listed for use as natural gas shut-off.
4. DeZurik, Homestead, Rockwell, Walworth or approved equal.

B. Gas Pressure Regulators:
1. 2-inch and smaller: Cast iron body, aluminum spring and diaphragm, Nitrile diaphragm, threaded ends, 150 psi W.O.G., -20°F to 150°F.

2.19 FLOW BLENDING VALVE

A. Acceptable manufacturer shall be Cla-Val or equal.

B. Valve shall be a pilot controlled hydraulically operated diaphragm type globe valve.

C. Valve shall operate by line pressure and respond to commands from the pilot control and maintain the flow rate of one fluid in direct proportion to the flow rate of another fluid.

D. Proportion of flows shall be maintained within five percent over the full range of flows.

E. Minimum flow velocity shall be 2 ft/sec.

2.20 SOLENOID VALVES

A. Acceptable manufacturer shall be Asco or equal.

B. Valve shall be pilot operated, normally open or normally closed.

C. Valve body shall be brass.

D. Disc shall be NBR, seals shall be PTFE.

E. Core tube shall be 305 S.S., core and plugnut shall be 430F S.S. springs shall be 302 S.S.

F. Piston shall be stainless steel or brass.

G. Shading coil shall be copper.

H. Solenoid valve shall be explosion-proof where shown.

I. Slow-closing solenoid valves shall be used on well pump prelube lines.

2.21 ELECTRIC VALVE ACTUATORS

A. Acceptable manufacturer shall be AUMA Actuators, or equal.

B. All electric actuators shall conform to the requirements of AWWA Standard C540-93.

C. Actuators shall contain motor, gearing, manual over-ride, limit switches, torque switches, drive coupling, integral motor controls, position feedback transmitter (where required) and mechanical dial position indicator (where required).

D. The motor shall be specifically designed for actuator service. The motor will be of the induction type with Class F insulation and protected by means of thermal switches imbedded in the motor windings. Motor enclosure will be totally enclosed, non-ventilated.

E. Motors shall be 480-volt, 3-phase, 60 hertz power. All gate valve and sluice gate actuators will operate on 460 volt – 3 phase power.

F. Actuator enclosure shall be NEMA 4 (watertight). All external fasteners on the electric actuator will be stainless steel. Fasteners on limit switch and terminal compartments shall be captured to prevent loss while covers are removed.

G. Actuator shall be supplied with a watertight terminal compartment seal between the terminal compartment and balance of the actuator.

H. All gearing shall be grease lubricated and designed to withstand the full stall torque of the motor.

I. Manual over-ride shall be by handwheel. Manual operation will be via power failing to minimize required rimpull and facilitate easy change-over from motor to manual operation when actuator is under load. Return from manual to electric mode of operation will be automatic upon motor operation. A seized or inoperable motor shall not prevent manual operation.

J. Light switches shall be furnished at each end of travel. Limit switch adjustment shall not be altered by manual operation. Limit switch drive shall be by countergear. Limit switches must be capable of quick adjustment requiring no more than five (5) turns of the limit switch adjustment spindle. One set of normally open and one set of normally closed contacts will be furnished at each end of travel where indicated. Contacts shall be of silver and capable of reliably switching low voltage DC source from the control system furnished by others.

K. Mechanically operated torque switches shall be furnished at each end of travel. Torque switches will trip when the valve load exceeds the torque switch setting. The torque switch adjustment device must be calibrated directly in engineering units of torque.

L. All wiring shall be terminated at a plug and socket connector.

M. Quarterturn actuators will be furnished with mechanical stops that restrict the valve/actuator travel.

N. Actuator must be capable of the following valve closing times/operating speeds: quarterturn valves – 60 second closing time, gate valves and sluice gates – 12 inches per minute operating speed.

O. Actuators will be capable of operating in an ambient temperature range of -20 to +175 degrees F (without motor controls) and -20 to +160 degrees F (with motor controls).

P. All actuators in open/close service will be furnished with integral motor controls consisting of reversing starters, control transformer, phase discriminator, monitor relay (to signal fault conditions such as thermal switch trip, torque switch tripped in mid-travel, wrong phase sequence or phase failure), "open-stop-close" pushbuttons, "local-off-remote" selector switch in addition to red and green indicating lights. An interface with the control system must be furnished with optical isolators to separate incoming voltage signals from the internal motor controls.

Q. Actuators in modulating service will be selected such that the required dynamic valve torque is no more than 60% of the electric actuator's maximum rated breakaway torque. Power gearing in modulating actuators shall have zero backlash between the motor and actuator output.

R. All actuators in modulating service will be furnished with a feedback potentiometer in addition to the following motor controls: reversing starters, control transformer, phase discriminator, monitor relay, positioner, "open-stop-close" pushbuttons, "local-off-remote" selector switch in addition to red and green indicating lights. The positioner shall be capable of accepting a 4-20mADC command signal and positioning the valve by comparing the command signal with the present valve position as indicated by the feedback potentiometer mounted inside of the actuator. The positioner shall be field adjustable to fail to the "open", "closed", or "last" position on loss of 4-20mADC command signal.

S. Provide water tight terminal compartment seal between actuator terminal compartment and balance of actuator.

T. Provide IP68 submersible rated actuator enclosure rated 20 feet for 72 hours.

U. Provide actuator corrosion protection rated type KS.

2.22 PILOT OPERATED SURGE RELIEF VALVE

A. Manufacturer should be GA Industries, Inc., Valmatic, or equal.

B. Construction: Surge Relief Valve shall consist of a main valve assembly and a pilot control system, completely assembled and tested as a unit and ready for field installation.

C. Main Valve

Main valve body shall be angle or globe style of high strength [cast iron conforming to ASTM A126 Class B with integral flanges, faced and drilled per ANSI B16.1 Class 125 cast ductile iron conforming to ASTM A536 with integral flanges, faced and drilled per ANSI B16.42 Class 150 as listed in the valve schedule as shown on plans. The valve shall be "full-ported" with a flow area through the valve no less than the area of its nominal pipe size when the valve is fully open.

The main valve shall operate on the differential piston principle such that the area on the underside of the piston is no less than the pipe area and the area on the upper surface is greater than that of the underside. There shall be no diaphragms or springs in the main valve.

D. The valve piston shall be guided on its outside diameter by long stationary vee-ports located downstream of the seat to minimize the consequences of throttling. All throttling shall be by the vee-ports and not by the seat itself. All internal guiding and sealing surfaces shall be stainless steel.

A replaceable seat ring of Buna-N or other suitable material shall be mechanically attached to the piston by means of a stainless steel follower ring and stainless steel fasteners.

The piston shall be sealed by Buna-N or other resilient material suitable for the operating pressures and fluid type.

A position indicator rod shall be provided, mechanically attached to the piston, and passing through the valve cover. The indicator rod shall be sealed by a compression type, Teflon packing.

E. The valve shall be fully capable of operating in any position without the need of springs and shall not incorporate stems, stem guides or spokes in the waterway.

F. The main valve shall be serviceable in the line through a single flanged cover which provides easy access to all internal components. Globe style valve shall have an integral bottom pad or feet for the valve to rest on a pier.

G. Provide a system of hydraulic controls to enable the valve to perform the function(s) listed below.

Provide a direct-acting, diaphragm-operated, spring-loaded stainless steel relief pilot. The pilot spring shall be factory set at the desired relief pressure, but easily field adjustable from near zero to 10% above the factory setting. The relief pilot shall be factory set at 100 psig.

Provide an adjustable closing speed control, y-strainer with stainless steel screen, pilot isolating valves and all stainless steel pilot piping. Pilot system shall be suitable for the working pressure.

H. Shop Finishing

Exterior ferrous surfaces shall be painted with 1 coat of manufacturers standard primer.

Interior, submerged ferrous surfaces shall be painted with 2 coat(s) of NSF-61 approved epoxy paint.

I. FUNCTION

The pressure relief valve shall remain tightly closed whenever system (inlet) pressure is below the setting of the relief pilot.

The pressure relief valve shall quickly open when the system pressure exceeds the setting of the relief pilot.

The pressure relief valve shall remain open as long as the system pressure equals or exceeds the setting of the relief pilot.

The pressure relief valve shall close slowly when the system pressure falls below the setting of the relief pilot. The speed of valve closure shall be adjustable.

2.23 VALVE BOXES

A. Acceptable manufacturer shall be Clow, Tyler, or equal.

B. Valve boxes shall be three-piece assembly constructed of cast iron in accordance with ASTM A48, Class B.

C. Valve box diameter shall be 5¼ inches.

D. All valves shall be provided with extended stem.

E. Stop stem 12 inches below box cover.

F. Provide one 4-foot long wrench for operation.

G. Provide valve box hangers by Adaptor, Inc., or equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install in accordance with shop drawings and manufacturer's recommendations. After installation demonstrate trouble-free operation in the presence of the Engineer.

3.02 FIELD QUALITY CONTROL

A. Field tests shall be conducted on the unit identified above.
   1. Field tests shall be conducted when appropriate process liquid is available.
   2. Field test shall be conducted by manufacturer's representative in the presence of the Engineer.
   3. Engineer shall be notified in advance of any field tests.

B. All defects noted during tests shall be corrected promptly at the expense of the manufacturer.
   1. When necessary, field test shall be repeated until requirements of specifications have been met.

2. All testing and modifications to equipment required to meet specification shall be at the expense of the manufacturer.

C. When manufacturer is unable to demonstrate by test results that equipment conforms to requirements of specifications. The equipment shall be rejected and replaced with acceptable units at the manufacturer's expense.

D. Minimum start-up operator training and final adjustment service by manufacturer shall be 1 day with a minimum of 1 trip.

E. The time for start-up, operator training and final adjustment shall be designated by the Owner and shall be within the one year guarantee period after final acceptance.

F. Qualifications of Start-up Personnel
1. Personnel shall be authorized by the manufacturer to start-up and initiate warranty of the equipment provided.
2. Personnel shall come to the site with the required tools and electrical instruments.
3. Personnel shall have full knowledge of electrical controls pertaining to the equipment and control panels furnished.
4. Failure to provide personnel with full qualifications shall be cause for service trip to be disqualified as part of requirements and may be cause for reimbursement for costs incurred by the Owner due to services required for start-up inspections.

3.03 VALVE TAGS

A. On completion of the work, furnish tags for all valves.

B. Attach to each valve a tag as described below. The numbers on the tags shall run consecutively to correspond with numbers provided by the Owner.

C. Tags are to be brass or approved plastic material 2-inch diameter with 3/16-inch hole and 1-inch diameter brass ring. Numeral to be 5/8-inch high and lettering to be 1/4-inch high. If brass tags are used, the lettering is to be black. If plastic tags are used, they shall be black and white lettering. Tags are to be fastened to valve stems with short sections of beaded or linked brass chain.

- END OF SECTION -

SECTION 15100B

HVAC VALVES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the contract, including General and Supplementary Conditions and Division 1 specification sections apply to work of this Section.

1.02 RELATED WORK

A. Section 15110B Pipe and Pipe Fittings

1.03 QUALITY ASSURANCE

A. Substitution of Materials: Refer to General Conditions of the Contract.

1.04 SHOP DRAWINGS

A. Include dimensions, capacities, materials of construction, weights, wiring diagrams and appropriate identification for all equipment in this Section.

1.05 DESIGN CRITERIA

A. Where valves are specified for individual mechanical services (i.e., hot water heating, steam, etc.), all valves shall be of the same manufacturer.

PART 2 - PRODUCTS

2.01 GAS VALVES

A. Manufacturers: Walworth, Powell or approved equal.

B. Two inch (2") and smaller Walworth 1700 or Powell 2202 lubricated plug valves. Complete with cast iron body, wrench operated and screwed ends suitable for 125 PSI service.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Properly align piping before installation of valves in an upright position; operators installed below the valves will not be accepted.

B. Install valves in strict accordance with valve manufacturer's installation recommendations. Do not support weight of piping system on valve ends.

END SECTION

SECTION 15170B

MOTORS AND STARTERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the contract, including General and Supplementary Conditions and Division 1 specification sections apply to work of this Section.

1.02 RELATED WORK

A. Section 15171B Variable Frequency Drives

B. Division 16 Electrical for Power Wiring

1.03 QUALITY ASSURANCE

A. Substitution of Materials: Refer to General Conditions of the Contract.

1.04 SHOP DRAWINGS

A. Include dimensions, capacities, materials of construction, weights, wiring diagrams and appropriate identification for all equipment in this Section.

1.05 REFERENCE STANDARDS

A. ANSI/IEEE 112 - Test Procedure for Polyphase Induction Motors and Generators

B. Constructed in accordance with ASME

C. ANSI/ NEMA MG-1 - Motors and Generators

D. ANSI/NFPA 70 - National Electrical Code

PART 2 - PRODUCTS

2.01 MOTOR REQUIREMENTS

A. All motors shall be NEMA standard motors rated as indicated in the motor starter schedule.

2.02 STARTING EQUIPMENT

A. Manufacturers: Allen-Bradley, Cutler Hammer, Square D, General Electric or ABB Control Inc.

B. All starters shall be NEMA standard sizes and all starting equipment shall be of the same manufacturer.

C. All starters, pushbuttons and selector switches shall have NEMA Type 1 enclosures.

2.03 STARTERS

A. All manual starters shall be two pole, toggle operated for single phase fractional horsepower service with overload protection, and where indicated complete with pilot light and/or flush plate and pull-box.

B. All magnetic starters shall be combination type with circuit breaker across the line for three phase service with reset button in cover, overload protection for each phase, undervoltage protection, missing phase protection, phase reversal, built-in control circuit transformer with 120 volt operating coils and "hand-off-auto" selector switch factory mounted in starter flange.

C. All starters shall be equipped with auxiliary contacts or control relays for equipment control interlocking as required.

PART 3 - EXECUTION

3.01 MECHANICAL CONTRACTOR

A. Shall furnish all starting equipment including pushbutton and pilot light stations, selector switches, relays. He shall turn all manual and magnetic starters over to the Electrical Contractor with complete instructions and wiring diagrams required for a complete installation. All other control equipment shall be turned over to the Temperature Control subcontractor for installation.

B. Shall furnish and install all control wiring except as indicated otherwise.

C. Shall confirm voltage requirements with the Electrical Contractor prior to ordering equipment.

3.02 ELECTRICAL CONTRACTOR

A. Will furnish and install all fused and/or circuit breaker disconnect switches, except as indicated otherwise.

B. Will furnish and install all power wiring from panel board to motors and junction boxes in factory-assembled units.

C. Will install all starters in cooperation with and under the supervision of the Mechanical Contractor.

D. Will furnish and install control wiring as indicated. See E-Series drawings.

END SECTION

SECTION 15250

BASIC MECHANICAL HVAC REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section includes general administrative and procedural requirements for mechanical HVAC installations.

1.02 REGULATORY REQUIREMENTS

A. Conform to all state and local code requirements.

B. Obtain permits and request inspections from authority having jurisdiction and pay for all fees incidental thereto.

1.03 PROJECT/SITE CONDITIONS

A. Install work in locations shown on drawings, unless prevented by project conditions.

B. Project design is based around the first listed manufacturer in relative specification sections. Subsequent manufacturer or equals listed are also acceptable. However, the use of these manufacturers may result in minor design changes involving equipment layout, supports, etc. The Contractor shall be responsible for such and include any modifications required as part of his bid.

C. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of Architect/Engineer before proceeding.

1.04 ACCESSIBILITY

A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.

B. Extend all grease fittings to an accessible location.

1.05 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

1.06 MECHANICAL INSTALLATIONS

A. Coordinate mechanical equipment and materials installation with other building components.

B. Verify all dimensions by field measurements.

C. Arrange for chases, slots, and openings in other building components to allow for mechanical installations.

D. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.

E. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the building.

F. Coordinate the cutting and patching of building components to accommodate the installation of mechanical equipment and materials.

G. Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum head room possible.

H. Install mechanical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

I. Coordinate the installation of mechanical materials and equipment above ceilings with suspension system, light fixtures, and other installations.

1.07 CUTTING AND PATCHING

A. This article specifies the cutting and patching of mechanical equipment, components, and materials to include removal and legal disposal of selected materials, components, and equipment.

B. Cutting and patching shall be performed per Division 1 section entitled Cutting and Patching. Where referenced section is not included as part of this specification and as a minimum, the Contractor shall perform cutting and patching as outlined in this article.

C. Do not endanger or damage installed work through procedures and processes of cutting and patching.

D. Arrange for repairs required to restore other work, because of damage caused as a result of mechanical installations.

E. Where changes or removal of existing equipment, devices, etc. takes place. Contractor shall be responsible for restoring surfaces where original equipment devices, etc. were originally located to match existing surrounding surfaces.

F. No additional compensation will be authorized for cutting and patching work that isn necessitated by ill-timed, defective, or non-conforming installations.

G. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
   1. Uncover work to provide for installation of ill-timed work;
   2. Remove and replace defective work;

3. Remove and replace work not conforming to requirements of the Contract Documents.
4. Install equipment and materials in existing structures.

H. Cut, remove, and legally dispose of selected mechanical equipment, components, and materials as indicated including, but not limited to, removal of mechanical piping, heating units, plumbing fixtures and trim, and other mechanical items made obsolete by the new work.

I. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

J. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

K. Locate, identify, and protect mechanical and electrical services passing through remodeling or demolition area and serving other areas required to be maintained operational. When services must be interrupted, provide temporary services for the affected areas and notify the Owner prior to changeover.

1.08 ELECTRICAL CONNECTIONS

A. Line voltage wiring (115 volts and over) required for the connection of the heating and ventilating equipment to be done by the Electrical Contractor; line voltage temperature control wiring required for the operation of the HVAC system shall be by the Mechanical Contractor, unless shown on the electrical drawings (Division 16). Low voltage wiring (below 115 volts) to be done by the Mechanical Contractor.

B. The Mechanical Contractor to furnish necessary controls, wiring diagrams, and instruction sheets, and coordinate his work with that of the Electrical Contractor to assure proper connection and operation of controls and equipment.

C. The Mechanical Contractor to be responsible for the operation of the system, temperature, safety, and other controls on the work during installation and guarantee period including equipment furnished by Owner.

D. Magnetic starters, pushbutton stations, pilot lights, etc. not an integral part of packaged mechanical equipment, to be furnished by the Electrical Contractor, unless otherwise noted.

E. Disconnect switches, fused disconnects, capped safety switches, etc. to be furnished and installed by the Electrical Contractor.

F. Electrical connections to be per Division 16 requirements.

1.09 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Complete operating and maintenance instructions as outlined in Division 1. As a minimum, the Contractor shall provide the following:

1. The Contractor shall instruct the Owner's representative on the operation andmaintenance of the mechanical system for a minimum of four (4) hours as well as provide three (3) sets of bound instructions and parts lists on all major mechanical equipment to the Owner before final payment will be authorized. The Contractor shall include a training verification form which

states that training has been adequately performed. The verification form must be signed and dated by the Owner's representative and all parties must receive a copy.Instructions shall be inserted in a 3-ring binder with tabbed division sheets. The first section shall include an Address Sheet with each equipment manufacturer's phone number and local representative including phone number.

1.10 PROJECT RECORD DOCUMENTS

A. Conform with the General Conditions and Division 1.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

- END OF SECTION -

SECTION 15255

SUPPORTS, SLEEVES, AND SEALING FOR MECHANICAL HVAC SYSTEMS

PART 1 - GENERAL

1.01 SCOPE

A. This section includes specifications for supports of all HVAC equipment and materials as well as sleeves and sealing.

PART 2 - PRODUCTS

2.01 STRUCTURAL SUPPORT

A. Provide all supporting steel required for the installation of mechanical equipment and materials, whether or not it is specifically indicated or sized, including angles, channels, beams, etc. to suspend or floor support mechanical equipment.

B. All supports shall be Type 304 stainless steel or hot dip galvanized after fabrication.

2.02 PIPE HANGERS AND SUPPORTS

A. All pipe hangers and support shall conform to Specifications Sections 05500 and 15050.

2.03 FLASHING

A. Metal Flashing: 20 gage Type 316 stainless steel.

B. Lead Flashing: 5 pounds per square foot sheet lead for waterproofing; 1 pound per square foot sheet lead for soundproofing.

C. Flexible Flashing: 47 mil thick sheet compatible with roofing.

D. Caps: Stainless steel, 22 gage minimum; 16 gage at fire resistant elements.

2.04 SLEEVES

A. Refer to Specification Sections 05500 and 15050.

2.05 SEALING AND FIRESTOPPING

A. Non-Rated Penetrations

1. Pipe Penetrations Through Below Grade Walls: In exterior wall openings below grade, use a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the uninsulated pipe and the cored opening or a water stop type wall sleeve.
2. Pipe Penetrations: At pipe penetrations of non-rated interior partitions, floors and exterior walls above grade, use urethane caulk in annular space between pipe insulation and sleeve.

3. Duct Penetrations:
   a. Annular space between duct (with or without insulation) and the non-rated partition or floor opening shall not be larger than 2 inches. Where existing openings have an annular space larger than 2 inches, the space shall be patched to match existing construction to within 2 inches around the duct.
   b. Where shown or specified, pack annular space with fiberglass batt insulation or mineral wool insulation. Provide 4 inch stainless steel escutcheon around duct on both sides of partition or floor to cover annular space.

PART 3 - EXECUTION

3.01 GENERAL

A. Provide all supporting devices as required for the installation of mechanical equipment and materials. All supports and installation procedures are to conform to the latest requirements of the ANSI Code for pressure piping.

B. Do not hang any mechanical item directly from a metal deck or run piping so it rests on the bottom chord of any truss or joist.

C. Support apparatus and material under all conditions of operation, variations in installed and operating weight of equipment and piping, to prevent excess stress, and allow for proper expansion and contraction.

3.02 FLASHING

A. Provide a flexible flashing and metal counterflashing; where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms, installed in accordance with manufacturer's instructions for sound control.

3.03 SEALING

A. Non-Rated Partitions:
   1. In exterior wall openings below grade, assemble rubber links of mechanical seal to the proper size for the pipe and tighten in place, in accordance with manufacturer's instructions.
   2. At all interior partitions and exterior walls, pipe penetrations are refired to be sealed. Apply sealant to both sides of the penetrations in such a manner that the annular space between the pipe sleeve or cored opening and the pipe or insulation is completely blocked.
   3. Duct penetrations through non-rated partitions shall require sheet metal escutcheons with fiberglass or mineral wool insulation fill for spaces that includelaboratories, clean rooms, animal rooms, kitchens, cart wash rooms, janitorclosets, cart wash rooms, toilet rooms, mechanical rooms, conference rooms,private consultation rooms, and where noted on drawings elsewhere.

- END OF SECTION -

SECTION 15259

IDENTIFICATION FOR MECHANICAL HVAC SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Identification of all mechanical HVAC products installed under Division 15.

B. Painting of mechanical HVAC piping and supports.

1.02 REFERENCES

A. American National Standards Institute (ANSI):
   1. ANSI/ASME: Scheme for the Identification of Piping Systems.

PART 2 - PRODUCTS

2.01 MATERIALS - IDENTIFICATION SYSTEMS

A. Color: Unless specified otherwise, conform with ANSI/ASME Al 3. 1.

B. Snap-On Plastic Pipe Markers: Manufacturer's standard preprinted, semi-rigid snap-on, color-coded pipe markers, conforming to ASME A 13.1

C. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers, conforming to ASME A13.1

D. Plastic Duct Markers: Manufacturer's standard laminated plastic, color coded duct markers. Conform to following color code:
   1. Green: Cold air.
   2. Yellow: Hot air.
   3. Yellow/Green: Supply air.
   4. Blue: Exhaust, outside, return, and mixed air.
   5. For hazardous exhausts, use colors and designs recommended by ASME A13.1
   6. Nomenclature: Include following:
      A. Direction of air flow.
      B. Duct service (supply, return, exhaust, etc.).
      C. Duct origin (from).
      D. Duct destination (to).
      E. Design cfm.

E. Plastic Equipment Markers: Laminated plastic, color coded equipment markers: Conform to following color code:
   1. Green: Cooling equipment and components.
   2. Yellow: Heating equipment and components.
   3. Yellow/Green: Combination cooling and heating equipment and components.
   4. Brown: Energy reclamation equipment and components.
   5. Blue: Equipment and components that do not meet any of the above criteria.

6. For hazardous equipment, use colors and designs recommended by ASME A13.1
7. Nomenclature: Include following, matching terminology on schedules as close as possible:
   a. Name and plan number.
   b. Equipment service.
   c. Design capacity.
   d. Other design parameters such as pressure drop, entering and leaving conditions, and rpm.
8. Size: Approximately 2½ by 4 inches (65 by 100 mm) for control devices, dampers, and valves; and 4 ½ by 6 inches (115 by 150 mm) for equipment.

F. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification, with corresponding designations indicated. Use numbers, letter, and wording indicated for proper identification and operation/maintenance of mechanical systems and equipment.

PART 3 - EXECUTION

3.01 GENERAL

A. Where more than one type of mechanical identification is specified for listed application, selection is installer's option, but provide single selection for each product category.

B. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 LABELING AND IDENTIFYING

A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
1. Plastic markers, with application systems: Install on pipe insulation segment where required for hot non-insulated pipes.
2. Locate pipe markers wherever piping is exposed in finished spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums), and exposed exterior locations as follows:
   a. Near each valve and control device.
   b. Near each branch, excluding short take-offs for fixtures and terminal units. Mark each pipe at branch, where flow pattern is not obvious.
   c. Near locations where pipes pass through walls, floors, ceilings, or enter inaccessible enclosures.
   d. At access doors, manholes, and similar access points that permit view of concealed piping.
   e. Near major equipment items and other points of origination and termination.
   f. Spaced at a maximum of 50-foot (15 m) intervals along each run. Reduce intervals to 25 feet (7.5 m) in congested areas of piping and equipment.
   g. On piping above removable acoustical ceilings, except omit intermediately spaced markers.

B. Equipment: Install engraved plastic laminate sign or equipment marker on or near each major item of mechanical equipment. Do not label equipment such as cabinet heaters and ceiling fans in occupied spaces.

1. Lettering Size: Minimum 1/4-inch (6 mm) high lettering for name of unit where viewing distance is less than 2 feet (0.6 m), ½-inch (13 mm) high for distances up to 6 feet (1.8 m), and proportionately larger lettering for greater distances. Provide secondary lettering 1/2 to 3/4 of size of principal lettering.
2. Text of Signs: Provide text to distinguish between multiple units, inform operatorof operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to name of identified unit.

C. Duct Systems: Identify air supply, return, exhaust, intake, and relief ducts with duct markers; or provide stenciled signs and arrows, showing duct system service and direction of flow.
1. Location: In each space where ducts are exposed or concealed by removable ceiling system, locate signs near points where ducts enter into space and at maximum intervals of 5 0 feet (15 m).

D. Adjusting: Relocate identifying devices which become visually blocked by work of this Division or other Divisions.

- END OF SECTION -

SECTION 15260

HVAC PIPING INSULATION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Piping insulation.

B. Accessories.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

1.	ASTM C534	Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
2.	ASTM E84	Test Method for Surface Burning Characteristics of (NFPA 255) Building Materials

B. Underwriters Laboratories Inc. (UL):
1. UL 723 Surface Burning Characteristics of Building Materials

1.03 QUALITY ASSURANCE

A. Materials
1. Flame/Smoke Ratings: Provide composite insulation (insulation, jackets, coverings, sealers, mastics, and adhesives) with flame-spread index of 25 or less, and smoke developed index of 50 or less, as tested by ASTM E84 (NFPA 255) method or UL 723.

PART 2 - PRODUCTS

2.01 INSULATION

A. Type B
Closed cell elastomeric flexible insulation; ASTM C534 Type 1; FR - Fire Retardant.
1. Acceptable Manufacturers:
   a. Rubatex
   b. Armaflex

2.02 ACCESSORIES

A. Adhesives: Compatible with insulation.

PART 3 - EXECUTION

3.01 PREPARATION

A. Install materials after piping has been tested and approved.

3.02 INSTALLATION

A. Install materials in accordance with manufacturer's instructions.

B. Continue insulation through penetrations.

C. In exposed piping, locate insulation and cover seams in least visible location.

D. Neatly finish insulation at supports, protrusions, and interruptions.

3.03 SCHEDULE

Piping Service Description	Insulation Type	Pipe Size (Inch)	Insulation Thickness (inch)
Refrigerant Gas Suction Piping	B	To 2"	1 ½"
Refrigerant Gas Liquid Piping	B	To 1 ½"	1 ½"

- END OF SECTION -

SECTION 15400

GENERAL PIPING REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Work included: This section includes the furnishing, installation and testing of piping systems. Piping systems shall include pipe, pipe supports, anchors, fittings, valves and other appurtenances and the installation of in-line equipment and appurtenances furnished by others for process piping systems, plumbing systems and heating, ventilating and air conditioning systems.

B. Related Sections and Divisions:
1. Applicable provisions of the general conditions shall govern the work in this section.
2. Section 01300 - Submittals.
3. Section 01650 - Starting, Testing and Operator Training.
4. Section 01661 – Testing and Inspection of Pipeline Construction
5. Section 01730 – Operation and Maintenance Data
6. Section 09800 – Painting and Special Coating
7. Section 11000 – Equipment Installation, Startup, Testing and Training Checklists and Certifications and Receipt of Spare Parts.
8. Section 15100 - Valves
9. Section 15050 – Methods and Materials for Pipeline Construction

1.02 CODES AND REGULATIONS

A. All piping work shall conform with all Federal and State and Local Codes and regulations. If codes or regulations conflict, the most stringent regulation shall apply.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300, Submittals including but not limited to:
1. Valves
2. Floor Drains
3. Piping
4. Insulation
5. Gauges
6. Strainers

B. Operation and maintenance manuals shall be provided in accordance with Section 01730, Operation and Maintenance Manuals

C. Submit installation and training checklists in accordance with Section 11000, Equipment, Installation, Training, and Receipt of Spare Parts Checklists.

1.04 CUTTING & PATCHING

A. All cutting and patching required to install the piping work shall be the responsibility of the Contractor.

B. No beam or other structural member may be cut without the Engineer's approval.

1.05 OPENINGS, CUTTING AND SLEEVES

A. Sleeves shall be one inch larger than outside pipe diameter and of sufficient length to pass through entire floor or wall construction, including plaster. Sleeves shall be provided in accordance with Section 15050, Methods and Materials for Pipeline Construction and the drawing details.

B. Openings for piping in existing buildings shall be carefully drilled or cored to prevent unnecessary damage or weakening of any structural member. No structural member shall be cut without Engineer's approval. Chopping will not be permitted.

C. Seal all openings between pipe and sleeve at each end with fiberglass and caulk opening with sealant. Provide seals at one end of sleeve passing through a fire rated wall or floor per Wisconsin Administrative Code.

1.06 CONNECTIONS TO EQUIPMENT FURNISHED BY OTHERS

A. The work shall include all required water and drain connections to heating, ventilating, and air conditioning equipment, and any Owner's equipment requiring such connections.

1.07 EQUIPMENT, INSTALLATION AND PROTECTION

A. Erect equipment in neat workmanlike manner, align, level and adjust for satisfactory operation; install for easy maintenance, inspection, operation, and replacement.

B. Mechanical equipment shall operate without objectionable noise or vibration. Piping shall be provided with flexible couplings to prevent noises or vibration transmission.

C. The Contractor shall be responsible for care and protection of his work and equipment until installation is complete and accepted by the Owner.

D. All open waste and vent piping must be capped air tight during construction to prevent foreign material from entering the sewer system or sewer gases from entering the building.

1.08 MATERIALS AND EQUIPMENT

A. Materials and equipment shall be new and of the make, type, size, and quality specified.

1.09 INSPECTION & TESTS

A. The Contractor shall arrange for all necessary inspections and tests of piping systems as required by State and local authorities or as specified.

B. The Contractor shall notify the Engineer when underground lines are ready for inspection and shall test all lines in the presence of the Engineer. After tests prove installation to be satisfactory, excavation may be backfilled.

C. All labor and material for tests are the responsibility of the Contractor. All defective workmanship or equipment shall be replaced and retested at the Contractor's expense.

D. Before testing piping systems, remove or isolate any equipment which may be damaged.

E. Test all piping in accordance with Section 01661, Testing & Inspection of Pipeline Construction.

1.10 CLEANING & DISINFECTION

A. After satisfactory completion of pressure tests, before permanently connecting equipment, clean equipment thoroughly, blow and flush piping as required to remove foreign material.

B. Disinfect all domestic water lines per the Wisconsin Administrative Code. Valve off and fill the system with a solution containing 50 PPM of chlorine and let stand for 24 hours or a solution containing 200 PPM of chlorine and let stand for 3 hours. Flush with clear water until no chlorine remains and test for bacteria. Submit report on final test indicating water sample free of bacteria.

C. After all tests are made and the installed work found satisfactory, the contractor shall go over his work to clean all equipment, piping, conduit and leave all in a clean and complete working condition. Remove from site any and all debris that accumulated during installation of the work.

D. All equipment specified with factory applied finish shall be wiped clean. If painted surface is scuffed or marred, touch up with paint approved for this service.

1.11 IDENTIFICATION

A. All piping shall be painted and labeled in accordance with Section 09800, Painting & Special Coatings.

1.12 VALVE TAGS

A. On completion of the work, furnish three glazed, framed, charts for all valves.

B. The valve identification charts shall show numbers of valve locations and purpose of valve and shall agree with valves on record drawings.

C. Attach to each valve a tag as described below. The numbers on the tags shall run consecutively to correspond with numbers on the chart. Tags shall be designated as follows: Cold Water (CW), Hot Water (HW), Hot Water Return (HWR), Non Potable Water (NPW), etc.

D. Tags are to be brass or approved plastic material 2" diameter with 3/16" hole and 1" diameter brass ring. Numerals shall be 5/8" high and lettering shall be 1/4" high. If brass tags are used, the lettering shall be black. If plastic tags are used, they shall be black and white lettering. Tags shall be fastened to valve stems with short sections of beaded or linked brass chain.

E. The valve identification chart shall be typed. Provide copies of the valve chart in the maintenance manual.

PART 2 - PRODUCTS

2.01 PIPING

A. Piping materials for the various piping and plumbing systems shall be in accordance with Section 15050, Methods and Materials for Pipeline Construction.

2.02 PLUMBING SPECIALTIES

A. Hose bibs shall be Woodford or equal.

B. Sampling Tap
   1. Sampling tap shall be smooth end.
   2. Sampling tap shall be Kohler Company, Model K-7870-C, or equal.

2.03 INSULATION

A. All domestic hot, and cold water lines shall be insulated with nominal 1/2" wall thickness flexible elastomeric closed cell pipe insulation, Armstrong Armaflex, or approved equal (having flame spread rating of 25 or less).

2.04 Valves

A. Valves shall be as specified in Section 15100 Valves.

B. Ball Valves:
   1. Shut-off valves 2 inches and smaller shall be Apollo 70 Series, or equal, ball valves with bronze body, 316 stainless steel ball and stem and Teflon seat. Valve shall be rated for 100 psig.
   2. Provide stem extensions where necessary for access.
   3. Provide a lever operator for each valve.

2.05 VACUUM BREAKERS

A. Vacuum breakers shall be atmospheric type, max. pressure 125 psi, max temp 212°F, meet ASSE Standards.

B. Vacuum breaker shall be Appollo 30-203 for 1/2-inch and 30-204 for 3/4-inch.

2.06 GAUGES

A. Acceptable manufacturers shall be Trerice, Ashcroft or equal.

B. Furnish and install gauges where shown on drawings or where required to perform start-up testing.

C. Gauges for wastewater, sludge and chemical systems shall be liquid filled, with factory installed diaphragm seals suitable for the application.

D. All gauges shall be mounted such that they can be read from the floor.

E. Scales shall be as shown on the drawings. If no range is shown, the normal operating pressure shall fall between 50 and 80% of the full scale.

F. All gauges shall be combination range gauges with inner scale in psi and outer scale in feet of water.

G. Provide each gauge with a bronze or stainless steel bourdon tube, 4 1/2 inch dial and ¼ inch NPT bottom connection.

H. Provide ¼ inch ball valve for isolation of all pressure gauges and switches.

2.06 STRAINERS

A. Acceptable manufacturers shall be Leslie Co or Bailey Co.

B. Furnish and install strainers where shown on drawings. Size according to the drawings

C. Unless otherwise noted provide cast iron 'Y' type strainers.

D. Strainer shall have a bronze or carbon steel body rated for 125 psig.

E. The strainer screen shall be 304 stainless steel or monel.

F. The screen perforations shall be .045 inches for water service.

G. Provide blow-off valve.

2.07 FLEXIBLE CONNECTIONS

A. Provide twin spherical neoprene flexible connections with flange connections. Connectors shall be constructed of multiple layers of rubber and fabric reinforced with internally spirally wound tempered steel. Connectors shall be rated for 125 psig and 250°F operation. Flexible connection sizes and locations shall be as shown on the drawings.

2.08 FLOOR DRAINS

A. Floor drains shall be as shown on the plans and in the Plumbing Fixture Schedule.

B. Floor drains shall have 6-inch round, adjustable strainer top.

C. Floor drains receiving pump drainage piping shall be provided with funnel converter assembly.

D. Provide polished bronze top grate for all floor drains.

E. Each drain shall be provided with a trap.

2.09 CLEAN OUTS

A. Clean outs shall be Zurn, or equal, as shown on the plans and in the Plumbing Fixture Schedule.

B. Each clean out shall have a dura-coated cast iron body, be adjustable to meet finished floor conditions, and be gas and watertight.

C. Clean outs that are in elevated floors shall include a membrane flashing flange to prevent leakage to the lower floor.

D. Provide brass covers for clean outs.

2.10 HANGERS AND SUPPORTS

A. Hangers and supports shall be provided in accordance with Section 15050, Methods and Materials for Process Piping Installation: Exposed.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Unless otherwise specified, installation of piping shall be in accordance with Section 15050, Methods and Materials for Process Piping Installation.

B. The plumbing system shall be installed with hangers and supports in accordance with the Plumbing Code. Insulation saddles shall be used at supports of insulated piping.

C. The plumbing system shall be installed in accordance with local plumbing requirements and applicable portions of Chapter Comm 82 of the Wisconsin Administrative Code. Where requirements conflict, the stricter standard shall apply.

3.02 FIELD QUALITY CONTROL

A. Unless otherwise specified, testing shall be in accordance with Section 15050.

B. Building drainage systems shall be tested and inspected in accordance with local requirements and Chapter Comm 82 of the Wisconsin Administrative Code hereinafter called Plumbing code

- END OF SECTION -

SECTION 15440

PLUMBING FIXTURES AND TRIM

PART 1 - GENERAL

1.01 APPLICABLE PROVISIONS

A. Drawings and general provisions of contract, including general and supplemental conditions and Division 1 specification sections, apply to work under this Section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.
   1. State of Wisconsin – Department of Commerce – Division of Safety and Buildings Administrative Code; current edition.
      a. Chapter 81 to 87 - Plumbing

1.03 DESCRIPTION OF WORK

A. Furnish and install a complete and operable plumbing system as indicated on the drawings and as specified herein.

B. Provide and install plumbing fixtures, drains, hose bibbs, cleanouts, etc. where shown on the plans and as hereinafter specified.

C. All plumbing fixtures furnished for this project shall comply with the State of Wisconsin Water Conservation Standards as specified in Chapter Comm. 84.20 of the Wisconsin Uniform Plumbing Code.

D. All faucets shall be constructed from a lead-free brass alloy, and where used in drinking water applications, shall be certified to be NSF61, Section 9 compliant.

1.04 RELATED WORK ELSEWHERE

A. Division 11: Equipment

B. Division 12: Finishes

C. Division 15: Mechanical

D. Division 16 Electrical

1.05 SHOP DRAWINGS

A. Submit shop drawings in accordance with Section 15010.

B. Submit (6) six copies of drawings with dimensions, capacities, and information as soon as available from manufacturers.

1.06 OPERATION & MAINTENANCE MANUALS

A. Submit operation and maintenance manuals in accordance with Section 15010.

1.07 QUALITY ASSURANCE

A. Provide quality assurance in accordance with Section 15010.

B. All materials, equipment, and parts shall be new and unused of current manufacture.

C. Provide all necessary accessories required for a complete and operable system.

1.08 WARRANTY

A. Materials and workmanship shall be warranted for a period of not less than 1 year from the date of commissioning against defects in material and workmanship.

B. The warranty shall be comprehensive. No deductibles shall be allowed for travel time, service hours, repair parts cost, etc.

C. The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.01 GENERAL

A. Approved manufacturer:
   1. Contractor's option.

B. All materials and equipment furnished shall be current production of manufacturers regularly engaged in the manufacture of such items, and for which replacement parts are available. All materials and equipment shall be new (less than 1 year old when turned over to the Owner).

2.02 MANUFACTURERS

A. Plumbing fixtures as manufactured by Kohler, American Standard, Crane, Eljer or equal.

B. Brass products as manufactured by Engineered Brass Company, McGuire, Brasscraft, or equal.

C. Faucets as manufactured by Chicago Faucet, Kohler Brass, Zurn Brass, Speakman Brass, or equal.

D. Floor and wall cleanouts as manufactured by Schier, J.R. Smith, Josam, Zurn, Watts, or equal.

E. Floor as manufactured by J.R. Smith, Josam, Zurn, Watts, or equal.

F. Hose bibbs as manufactured by Woodford, Chicago, or equal.

G. Emergency equipment as manufactured by Guardian, Bradley, Haws, Speakman, Encon, or equal.

H. Insulation kits for barrier free lavatories and sinks as manufactured by Truebro, Inc., Brocar Products Inc., Pro Wrap, Insul-Guard, or equal.

I. Water closet seats as manufactured by Bemis, Olsonite, Church or equal.

2.03 FINISHES

A. All fixture colors to be white and finish to be chrome plated unless otherwise specified.

B. Wall cleanouts to have flush stainless steel trim plate. Floor cleanouts to have nickel bronze covers.

2.04 PLUMBING FIXTURE LIST

A. Water closets:
   1. WC-1: Kohler K-3481 Wellworth elongated toilet; Bemis 1955SS/C solid plastic seat; EBC No. CAH12X angle supply and stop with chrome plated escutcheon.

B. Lavatories:
   1. L-1: Kohler K-2196-4 Pennington lavatory; Chicago No. 802-VE2805CP faucet with No. 390 handles; Kohler K-77 15 perforated drain; EBC No. TA14O-B trap; EBC No. LA.H12K supplies with stops and chrome plated escutcheons.

C. Emergency Eye Wash:
   1. EEW/SH-I: Guardian Model GCBF19O9 barrier free emergency eye/face wash shower station; 10" diameter stainless steel shower head; 1" U.S. made stay open brass ball valve epoxy powder coated orange stainless steel triangular pull handle; 1 ¼" schedule 40 brass pipe and fittings epoxy powder coated orange with floor flange epoxy powder coated orange (4) OS style spray heads shall have integral flip top dust covers with push type brass ball valve epoxy powder coated orange; 1¼" supply connection; emergency identification sign.

D. Hose Bibb:
   1. HB-1: Woodford #67 automatic draining hose bibb with integral vacuum breaker/backflow preventer.
   2. HB-2: Woodford #24P-3/4 hose bibb with integral vacuum breaker/backflow preventer and metal wheel handle.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify equipment is in compliance with approved submittal drawings.

3.02 FIELD MEASUREMENTS

A. Field verify all measurements. Do not base on contract drawings.

B. Identify conflicts with the work of other trades prior to installation of work.

C. Adjust system to satisfy field requirements.

3.03 DELIVERY, STORAGE AND HANDLING

A. Receive, sign for and store all equipment in this section.

B. Maintain original quality and condition of equipment while it is in storage.

3.04 INSTALLATION

A. Floor Drains
   1. Drains shall have "P" trap same size as drain. Set top perfectly level and at height to allow proper pitch of floors toward drain as scheduled on the drawing.
   2. Provide safing material conforming to COMM 84.30(6) extending a minimum 12" beyond drain at all floor drains over excavated areas.

B. Plumbing Fixtures
   1. Roughing-In Dimensions - Install the fixtures to the roughing-in dimensions shown on the architectural plans.

C. Water Closets
   1. Mounting: Closet bowl to be solidly fastened to closet carrier or floor flange by brass bolts with stainless steel caps. Closet bowl to have solid bearing on wall or floor. The closet bowl shall be thoroughly checked for level and for secure and substantial connection to the closet carrier or floor flange.
   2. Seal: Seal between closet bowl and closet carrier or floor flange to be made with molded wax ring gasket to ensure absolute gas and watertight seal.
   3. Water Connection: The water connection shall be made to the water closet with trim as specified. All exposed brass shall be chrome plated, and pipes to wall or floors shall be covered with chrome plated escutcheon plates and cover tube to fit pipe.

D. Lavatories And Sinks
   1. Waste Connection - Waste connection to be made with heavy chromium plated swing joint "P" traps. The "P" trap shall have standard iron pipe threads for connection to the building drainage system and slip joint with preformed neoprene or plastic gasket for connection to P.O. plug in lavatory.
   2. Escutcheon plates and cover tube of the proper size shall be installed between trap and wall.
   3. Water Connection - The water connection shall be made to the lavatory with trim as specified. Rough-in all supply pipe stubs so that supply pipes to lavatory will run in a straight, vertical line from stops to faucets.
   4. All exposed pipe to walls or floors shall be chromium plated and have escutcheon plates.

E. General
   1. All fixtures shall be set in a true and level manner with connection to soil, waste, vent, and water supply pipes. Adjust all valves, pack all stuffing boxes and leave work in a finished, clean and satisfactory working condition.
   2. Protect all fixtures after they are set. This Division of the Work is responsible for them until the acceptance of the work, at which time all fixtures shall be in perfect condition and complete working order. Strictly advise all other Divisions to refrain from using toilets, especially before water connections have been made.
   3. All bolting and fastening to walls, etc., must be with through type toggles and washer bolting. No screw and plug or expansion shield fastenings will be accepted. All fixture fastenings shall be made with steel bar supports and plates or other approved method.
   4. At all wall hung lavatories and electric water coolers, Contractor must install thru going bolts in hole provided in bottom rear drapery to prevent lifting of front rim.
   5. Seal all openings between floors, walls and fixtures with a mildew-resistant silicone sealant. Sealant shall be white for white fixtures and clear for colored fixtures.

6. Wall mounted fixtures shall be rigidly supported by a concealed hanger which is attached to structural members so that the load is not transmitted to the fixture drain connection or any other part of the plumbing system.
7. All countertop stainless steel sinks shall be set in a silicone caulk.

F. Barrier Free Requirements
1. All barrier free requirements shall comply with ICC/ANSI A 117.1 requirements and Wisconsin Building Code requirements.
2. Water Closets: The height of barrier free water closets shall be 17" to 19" to the top of the toilet seat from finished floor. Flush controls shall be hand operated or automatic and shall be mounted on the wide side of the toilet area no more than 30" above the floor.
3. Lavatories: Lavatories shall be mounted with the rim or counter surface no higher than 34" above finished floor and shall have a 29" clearance between finished floor and the bottom of the apron. Hot water and drain pipes under lavatories shall be insulated or otherwise configured to protect against contact and there shall be no sharp or abrasive surfaces under lavatories. Faucets shall have lever-operated, pushtype or sensor type controls and shall remain open at least 10 seconds.

3.05 OWNER TRAINING

A. Provide minimum of one hour training on equipment operation.

END OF SECTION

SECTION 15460

WATER HEATERS

PART 1 - GENERAL

1.01 APPLICABLE PROVISIONS

A. Drawings and general provisions of contract, including general and supplemental conditions and Division 1 specification sections, apply to work under this Section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.
   1. State of Wisconsin – Department of Commerce – Division of Safety and Buildings Administrative Code; current edition.
      a. Chapter 81 to 87 - Plumbing

1.03 DESCRIPTION OF WORK

A. Furnish and install a complete and operable heating, storage and control of the domestic hot water system as indicated on the drawings and as specified herein.

1.04 RELATED WORK ELSEWHERE

A. Division 11: Equipment

B. Division 12: Finishes

C. Division 15: Mechanical

D. Division 16 Electrical

1.05 SHOP DRAWINGS

A. Submit shop drawings in accordance with Section 15010.

B. Submit (6) six copies of drawings with dimensions, capacities, and information as soon as available from manufacturers.

1.06 OPERATION & MAINTENANCE MANUALS

A. Submit operation and maintenance manuals in accordance with Section 15010.

1.07 QUALITY ASSURANCE

A. Provide quality assurance in accordance with Section 15010.

B. All materials, equipment, and parts shall be new and unused of current manufacture.

C. Provide all necessary accessories required for a complete and operable system.

D. Water heaters shall be guaranteed for a minimum of three (3) years.

E. Water heaters shall comply with ASHRAE/IE 99 Standard for minimum efficiency levels for commercial water heaters.

1.08 WARRANTY

A. Materials and workmanship shall be warranted for a period of not less than 1 year from the date of commissioning against defects in material and workmanship.

B. The warranty shall be comprehensive. No deductibles shall be allowed for travel time, service hours, repair parts cost, etc.

C. The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.01 GENERAL

A. Approved manufacturer:
   1. Contractor's option.

B. All materials and equipment furnished shall be current production of manufacturers regularly engaged in the manufacture of such items, and for which replacement parts are available. All materials and equipment shall be new (less than 1 year old when turned over to the Owner).

2.02 PRODUCTS

A. Water heaters shall be as manufactured by Eemax, Chronomite, Bosch or equal.

B. Instantaneous Water Heater – IWH-1
   1. Tankless Water Heater shall be an Eemax Model EX720T12 with 480Y/277vac, 72kW to heat 20GPM at a temperature rise of 25 degrees F. Elements shall be replaceable cartridge insert. Element shall be iron free, nickel chrome material. Heater shall be fitted with 1 1/4" NPT. Heater shall be installed upright with water connections on bottom. Hot water storage tanks prohibited. Unit shall be Eemax or approved equal.

C. Instantaneous Water Heater IWH-2:
   1. Tankless Water Heater shall be an Eemax Model SP55 with, 240 vac, 5.5 kW to heat 0.5 GPM at a temperature rise of 75 degrees F. Unit shall have ABS-UL 94Vo rated cover. Element shall be replaceable cartridge insert. Unit shall have a replaceable filter in the inlet connector and a flow regulator in the outlet connector. Element shall be iron free, nickel chrome material. Heater shall be fitted with 3/8" compression nuts and sleeves to eliminate need for soldering. Heater shall be installed upright with water connections on top only. Hot water storage tanks prohibited. Unit shall be Eemax or approved equal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify equipment is in compliance with approved submittal drawings.

3.02 FIELD MEASUREMENTS

A. Field verify all measurements. Do not base on contract drawings.

B. Identify conflicts with the work of other trades prior to installation of work.

C. Adjust system to satisfy field requirements.

3.03 DELIVERY, STORAGE AND HANDLING

A. Receive, sign for and store all equipment in this section.

B. Maintain original quality and condition of equipment while it is in storage.

3.04 INSTALLATION

A. Set water heaters and storage tank in place and make hot and cold water connections with unions, or per manufacturer's requirements.

B. Provide valves in cold and hot water lines.

C. All wiring shall be furnished and installed by Electrical Contractor.

3.05 OWNER TRAINING

A. Provide minimum of one hour training on equipment operation.

END OF SECTION

SECTION 15488

NATURAL GAS SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of work is limited to piping and accessories as required to extend natural gas line from meter to gas fired equipment as indicated on drawings and schedules as required by this section.

1.02 REFERENCES

A. National Fire Protection Association (NFPA):
   1. Standard 54 (ANSI Z223. 1) National Fuel Gas Code (An American National Standard)

PART 2 - PRODUCTS

2.01 MATERIALS AND PRODUCTS

A. General
Provide piping materials and factory fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with NFPA 54 where applicable, base pressure rating on natural gas piping system maximum design pressures. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in natural gas systems. Where more than one type of material or product is indicated, selection is Installer's option.

2.02 BASIC PIPES AND PIPE FITTINGS

A. Building Distribution Piping
   1. Pipe Size 2 inches and Smaller: Black steel pipe; Schedule 40, malleable iron threaded fittings.
   2. Pipe Size 21/2inches and Larger: Black steel pipe: Schedule 40; wrought steel butt welding fittings.

B. Gas Piping (Underground)
Exterior gas piping shall be polyethylene plastic, "ALDYC A" by Dupont, "TR418" by Flexco or equal. Transition from plastic to steel shall be made underground with a heat fusion seal using either a coupling fitting or butter fusion seal. Install pressure test in accordance with standards set by the local utility.

2.03 SPECIAL VALVES

A. General
Special valves required for natural gas systems include the following types:
   1. Gas Cocks:
      a. Gas Cocks 2 inches and Smaller: 150 psi non-shock WOG, bronze straightway cock, flat or square head, threaded ends.

b. Gas Cocks 2 1/2 inches and Larger: 125 psi non-shock WOG, iron body bronze mounted, straightway cock, square head, flanged ends.

B. Manufacturer

Subject to compliance with requirements, provide gas cocks of one of the following:

1. DeZurik Corporation
2. Jenkins Bros.
3. Lunkenheimer Company
4. NIBCO, Inc.
5. Power (The Win.) Company
6. Rockwell International, Flow Control Division
7. Stockhain Valves and Fittings
8. Walworth Company

PART 3 – EXECUTION

3.01 INSTALLATION OF NATURAL GAS PIPING

A. Use sealants on metal gas piping threads which are chemically resistant to natural gas. Use sealants sparingly, and apply to only male threads of metal joints.

B. Remove cutting and threading burrs before assembling piping.

C. Do not install defective piping or fittings. Do not use pipe with threads which arechipped, stripped or damaged.

D. Plug each gas outlet, including valves, with threaded plug or cap immediately after installation and retain until continuing piping, or equipment connections are completed.

E. Install drip legs in gas piping where indicated, and where required by code or regulation.

F. Install "tee" fittings with bottom outlet plugged or capped, at bottom of pipe risers.

G. Install piping with 1/64 inch per foot (1/8 percent) downward slope in direction of flow.

H. Install piping parallel to other piping, but maintain minimum of 12-inch clearance between gas piping and steam or hydronic piping above 200'F.

I. Coordinate equipment gas pressure requirements with gas pressure available and serving building. Install gas pressure regulator at equipment as required. Size for pressure leaving meter, required pressure at equipment and required flow. Vent per code to atmosphere.

J. All pipe supports to be spaced a maximum of 5 feet.

3.02 GAS SERVICE

A. General

Coordinate with local gas Utility Company the installation of the new gas service. Consult with Utility as to extent of its work, costs, and fees associated with any service size increase. Pay such

costs and fees. Verify pressure leaving the meter. Gas piping distribution system was sized based on the indicated pressure leaving the meter as shown on the plans.

3.03 INSTALLATION OF PIPING SPECIALTIES

A. Do not conceal any gas piping or specialties.

3.04 INSTALLATION OF VALVES

A. Gas Cocks
Provide at connection to gas train for each gas-fired equipment item and on risers and branches where indicated.

B. Locate gas cocks where easily accessible, and where they will be protected from possible injury.

3.05 EQUIPMENT CONNECTIONS

A. General
Connect gas piping to each gas-fired equipment item with drip leg and shutoff gas cock. Comply with equipment manufacturer's instructions.

3.06 FIELD QUALITY CONTROL

A. Piping Tests
Inspect, test, and purge natural gas systems in accordance with NFPA 54.

3.07 ADJUSTING AND CLEANING

A. Cleaning and Inspecting
Clean and inspect natural gas systems.

- END OF SECTION -

SECTION 15831B

ELECTRIC HEATING TERMINAL UNITS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 specification sections apply to work this Section.

1.02 RELATED WORK

A. Section 15170B Motor and Starters.

1.03 QUALITY ASSURANCE

A. Substitution of Materials: Refer to General Conditions of the Contract.

1.04 SHOP DRAWINGS

A. Include dimensions, capacities, materials of construction, weights, wiring diagrams and appropriate identification for all equipment in this Section.

1.05 DESIGN CRITERIA

A. Electrical components and work must be in accordance with National Electrical Codes.

B. Electrical equipment and heaters shall be UL listed for service specified.

PART 2 - PRODUCTS

2.01 GENERAL

A. Furnish types, arrangements, and capacities as scheduled.

2.02 ELECTRIC UNIT HEATERS

A. Manufacturers: Berko, Brasch, Markel, Q-Mark or Trane.

B. Furnish units with heavy 16 gauge type 304 stainless steel casing with adjustable discharge louvers, corrosion resistant 316 stainless steel sheathed with 316 stainless steel fin tube heating element, NEMA approved totally enclosed motor of speed indicated, factory wired, assembled and tested. Safety fan guard and painted with one coat zinc chromate primer and two coats of corrosion resistant paint.

C. Prewired built-in control contactors and transformer. Automatic reset thermal overloads.

D. UL listed for corrosive areas and NEMA4X wash down requirements.

E. Integral thermostat.

2.03 ELECTRIC WALL HEATERS:

A. Manufacturers: Berko, Brasch, Electromode, Markel or Q-Mark.

B. Furnish units with steel or anodized aluminum 16 gauge front cover with pencil-proof louvered inlet and discharge grilles, steel sheath enclosed fin tube heating element, fan and permanently lubricated fan motor. Factory assembled, wired and tested. Recessed or surface type mounting box as indicated with baked enamel finish.

C. Complete with built-in fan delay switch, automatic reset thermal overheat protector, built-in disconnect switch and integral thermostat with a tamper resistant adjustment.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

A. Install units in accordance with manufacturer's installation instructions.

B. Coordinate location of units with other trades to assure correct recess size for recessed units.

C. After installation, provide protective covers to prevent accumulation of dirt on unit during balance of construction.

3.02 ELECTRIC UNIT HEATERS

A. Suspend units from building structure and as high as possible to maintain head room beneath units.

3.03 ELECTRIC WALL HEATERS

A. Mount units in locations where indicated on the drawings.

END SECTION

SECTION 15850B

FANS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the contract, including General and Supplementary Conditions and Division 1 specification sections apply to work of this Section.

1.02 RELATED WORK

A. Section 15170B Motors and Starters

B. Section 15171B Variable Frequency Drives

C. Section 15241B Vibration Isolators

D. Section 15242B V-Belt Drives

1.03 QUALITY ASSURANCE

A. Substitution of Materials: Refer to General Conditions of the Contract.

1.04 SHOP DRAWINGS

A. Include dimensions, capacities, materials of construction, weights, wiring diagrams and appropriate identification for all equipment in this Section.

1.05 DESIGN CRITERIA

A. Test and certify all fans in accordance with the applicable AMCA test code.

B. Each fan and motor combination shall be capable of delivering 110% of air quantity scheduled at scheduled static pressure. The motor furnished with the fan shall not operate into the motor service factor when operating under these conditions.

C. Where inlet and outlet ductwork or any fan is changed from that shown on the drawings, provide any motor, drive and/or wiring changes required due to increased static pressure or baffling necessary to prevent uneven air flow or improved mixing.

PART 2 - PRODUCTS

2.01 GENERAL

A. Furnish fans of size, class, type, arrangement and capacity as scheduled on the drawings.

B. Furnish complete with motors, wheels, drive assemblies, bearings, vibration isolation devices and accessories required for specified performance.

C. Use OSHA approved belt guards that totally enclose the entire drive. Construct guards of expanded metal to allow for ventilation and provide tachometer openings at shaft locations.

D. Statically and dynamically balance all fans so they operate without objectionable noise or vibration.

2.02 ROOF EXHAUSTERS

A. Manufacturers: Acme, Carnes, Cook, Greenheck, Jenn Fan, Twin City or Penn.

B. Furnish fans with centrifugal fan wheel, NEMA approved ball bearing motor, resiliently mounted, direct or adjustable V-belt drive as indicated, adjustable V-belt drive shall be as hereinbefore specified, integrally wired weatherproof disconnect switch and integral vibration isolators. Furnish an aluminum weatherproof fan and motor housing with base to fit over curb, self-acting or electric motorized multi-louver backdraft damper as indicated and acoustically treated curb. See architectural drawings for roof type and pitch. All belt driven units 1/3 HP and less shall be furnished with capacitor start motors and low temperature grease for low ambient starting.

C. Furnish manual type starter as indicated.

D. For RE-1, furnish corrosion resistant unit with Heresite or equal coating on all parts exposed to the air stream.

2.03 CEILING EXHAUST FANS

A. Manufacturers: Acme, Cook, Carnes, Greenheck, Jenn Fan, Twin City or Penn.

B. Furnish acoustically insulated fan and motor housing, direct connected centrifugal fan and motor, integral inlet grille, self-acting backdraft damper, roof jack, wall cap or eave cap as indicated and solid state speed control as indicated.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install all fans where indicated on the drawings and in accordance with manufacturers recommendations.

B. Roof curb mounted equipment shall be mounted on factory constructed curbs furnished with the fans. Roof curbs shall extend not less than 12" above adjoining roof and shall be sized to accommodate the roof openings and curb flange of the equipment being mounted. The curbs shall be constructed suitable to accommodate anchoring of the equipment being mounted.

C. Flashing and roof sealing of curbs including sealing of flashing flanges, cant strips, pitch seals at anchor bolts, etc., shall be by the Roofing Contractor.

D. Roof curbs shall be furnished and set in place by the Mechanical Contractor.

E. Ceiling exhaust fans shall have concealed supports and shall be set with the fan housing flush with the finish ceiling and inlet grille furnished with the fan shall cover opening between fan housing and ceiling.

END SECTION

SECTION 15855B

DIFFUSERS, GRILLES AND REGISTERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the contract, including General and Supplementary Conditions and Division 1 specification sections apply to work of this Section.

1.02 QUALITY ASSURANCE

A. Substitution of Materials: Refer to General Conditions of the Contract.

1.03 SHOP DRAWINGS

A. Include dimensions, capacities, materials of constructions, weights, wiring diagrams and appropriate identification for all equipment in this Section.

PART 2 - PRODUCTS

2.01 DIFFUSERS, GRILLES AND REGISTERS

A. Manufacturers: Agitair, Anemostat, Carnes, Krueger, Metalaire, Price, Titus or Tuttle and Bailey.

B. All grilles and registers located in ceilings shall be furnished with baked enamel finish of color selected by the Architect. Selection shall be from manufacturers standard color chart.

2.02 EXHAUST AND SOFFIT GRILLES

A. Furnish grilles with aluminum construction, flanged frame with sponge rubber gasket, fixed horizontal face fins with a ¾" maximum fin spacing set in an angular position.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install diffusers, grilles and registers where indicated on the drawings.

B. Coordinate exact and final location of all diffusers, grilles and registers with final lighting and ceiling layout.

END SECTION

SECTION 15890B

DUCTWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the contract, including General and Supplementary Conditions and Division 1 specification sections apply to work of this Section.

1.02 RELATED WORK

A. Section 15900B Ductwork Accessories

1.03 QUALITY ASSURANCE

A. Substitution of Materials: Refer to General Conditions of the Contract.

1.04 SHOP DRAWINGS:

A. Include dimensions, capacities, materials of construction, weights, wiring diagrams and appropriate identification for all equipment in this Section.

1.05 REFERENCE STANDARDS

A. SMACNA

B. NFPA 90A Standards for the Installation of Air Conditioning and Ventilating Systems.

C. UL 181

1.06 DESIGN CRITERIA

A. Construct all ductwork to be free from vibration, chatter, objectionable pulsations and leakage under specified operating conditions.

B. Use material, weight, thickness, gauge, construction and installation methods as outlined in the following SMACNA publications, unless noted otherwise:
   1. HVAC Duct Construction Standards, Metal and Flexible, 1st Edition, 1985.
   2. HVAC Air Duct Leakage Test Manual, 1st Edition, 1985.
   3. HVAC Systems - Duct Design, 3rd Edition, 1990.
   4. Rectangular Industrial Duct Construction Standard, 1st Edition, 1980.
   5. Round Industrial Duct Construction Standards, 1st Edition, 1977.
   6. Thermoplastic Duct (PVC) Construction Manual, 1st Edition, 1974.

C. Use products which conform to NFPA 90A, possessing a flame spread rating of not over 25 and a smoke developed rating no higher than 50.

PART 2 - PRODUCTS

2.01 GENERAL

A. Ductwork except as hereinafter noted shall be G-60 coated galvanized steel of lock forming grade conforming to ASTM Standards A-525 and A-527. Duct wall thicknesses, reinforcements, seams, joints, sealing, cross bracing, beading, hangers, supports, etc., shall be in accordance with the latest manual of heating, ventilating and air conditioning duct construction standards as published by the Sheet Metal and Air Conditioning Contractors National Assoc., Inc. (SMACNA).

B. All ductwork shall be 2" pressure class.

2.02 CHLORINE STORAGE ROOM EXHAUST AND INTAKE DUCTWORK

A. Ductwork shall be PVC coated steel wall thickness, reinforcements, seams, joints and cross bracing in accordance with latest SMACNA standards. Seal all ductwork air tight in accordance with SMACNA seal class A requirements.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Verify dimensions at the site, making field measurements and drawings necessary for fabrication and erection. Check plans showing work of other trades and consult with Architect in the event of any interference.

B. Make allowances for beams, pipes or other obstructions in building construction and for work of other contractors. Transform, divide or offset ducts as required, in accordance with SMACNA, except do not reduce duct to less than six inches in any dimension and do not exceed a 6:1 aspect ratio.

C. Cut or drill test holes in ducts where indicated or as required. Cap with neoprene plugs.

D. Provide frames constructed of angles or channels for coils, filters, dampers or other devices installed in duct systems, and make all connections to such equipment, including equipment furnished by others. Secure frames with gaskets and screws or nut, bolts and washers.

E. Seal water tight with G.E. Silicone Construction Sealant all joints within 6" of bottom of all exhaust ductwork from outside termination back to automatic exhaust dampers and/or backdraft dampers.

F. Furnish and install a drip pan in exhaust and relief ductwork under each roof exhauster and weatherproof hood per plan detail. Seal water tight with G.E. Silicone Construction Sealant all joints in drip pan and all joints within 6" of bottom of drip pan.

G. Install all automatic dampers furnished by the Temperature Control Contractor or Subcontractor. This Contractor shall score the end of the damper rod. Scoring to be parallel with the damper blade.

H. Transverse joints of all pressure classes of ductwork may be made with Ductmate Industries, Inc. or Nexus flanged type joints. Joints to be complete with 20 gauge angles with integral mastic

sealer, gasket tape, corner pieces, snap-on cleats, etc. Joint shall have zero percent leakage at all pressures up to 10" W.G.

I. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

J. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

K. Use double nuts and lock washers on threaded rod supports for all ducts.

END SECTION

SECTION 15900B

DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the contract, including General and Supplementary Conditions and Division 1 specification sections apply to work of this Section.

1.02 RELATED WORK

A. Section 15890B Ductwork

1.03 QUALITY ASSURANCE

A. Substitution of Materials: Refer to General Conditions of the Contract.

1.04 SHOP DRAWINGS

A. Include dimensions, capacities, materials of construction, weights, wiring diagrams and appropriate identification for all equipment in this Section.

1.05 REFERENCE STANDARDS

A. NFPA 90A - Standard for Installation of Air Conditioning and Ventilating Systems.

B. SMACNA - HVAC Duct Construction Standards - Metal and Flexible, First Edition, 1985.

C. UL 214

D. UL 555 - Standard for Fire Dampers and Ceiling Dampers.

E. UL 555S - Leakage Rated Dampers for Use in Smoke Control Systems

PART 2 - PRODUCTS

2.01 MANUAL VOLUME DAMPERS

A. Air Balance, Ruskin, Vent Products or approved equal.

B. Furnish manual volume dampers where indicated and where required to adjust air quantities. Maximum blade length to be 48" and maximum blade width to be 6" with double bend each edge. Each blade up to 18" long shall have 3/8" square pivot rod. Blades 19" to 48" in length shall have ½" square pivot rods for full length of blade. Provide, for each damper blade, Ventlock #641 or Young Regulator Co. #403B locking damper regulator and Ventlock #607 or Young Regulator Co. #656 end bearings. When more than one damper blade is required, dampers and quadrants shall be arranged for opposed blade operation. On ducts where are internally lined, provide spacers on the damper shaft to keep the damper blades clear of the lining. Provide waterproof plywood block or Ventfabrics #637 Ventlock elevated locking damper regulator on insulated ductwork.

2.02 DUCT ACCESS DOORS

A. Air Filter Corp. or Cesco, Inc.

B. Furnish where indicated metal type, gasketed completely removable type with cam locks. Doors to be double walled and insulated where ductwork is lined or insulated.

2.03 WEATHERPROOF LOUVERS

A. American Warming, Air Balance Inc., Cesco, Dowco, Industrial Louvers, Inc., Louvers & Dampers, Inc., Ruskin, Shipman Industries, Greenheck and Vent Products.

B. Furnish louvers with .081" extruded aluminum alloy blades, frame and supports, horizontal "J" style drainable blades with maximum of 4'-0" unsupported length in a fixed 6" core, 6" minimum blade depth, 3-1/2" blade spacing and 35 deg. blade angle and mullions invisible from exterior face.

C. Furnish louvers with channel type frame for installation in new construction and flange type frame for installation in existing construction with 1/2" mesh .063" aluminum bird screen in extruded U frame mounted behind blades. All screws, bolts, hardware, etc., shall be stainless steel.

D. Units to have a baked enamel finish of color as selected by the Architect.

2.04 SOUND ATTENUATING LOUVERS

A. IAC Noiseshield or equivalent

B. Furnish louvers with 22 gauge glavanized blades, frame and supports, horizontal "J" style drainable blades with maximum of 4'-0" unsupported length in a fixed 6" core, 6" minimum blade depth, 3-1/2" blade spacing and 35 deg. blade angle and mullions invisible from exterior face.

C. Furnish louvers with channel type frame for installation in new construction with 1/2" mesh .063" aluminum bird screen in extruded U frame mounted behind blades. All screws, bolts, hardware, etc., shall be stainless steel.

D. Units to have a baked enamel finish of color as selected by the Architect.

2.05 CONTROL DAMPERS

A. Manufacturer: Tamco 9000 SC. No substitutes.

B. Automatic dampers and line voltage damper acutators shall be furnished by the FMS/TCS Contractor but shall be set in place by the Mechanical Contractor. Dampers shall be of the balanced type with a maximum blade width of 8" and length of 48". Damper frames shall be aluminum with Celcon and polycarbonate bearings and silicone side seals.

C. Dampers for proportioning control shall have opposed blade action. Dampers for two position, open-closed control shall have parallel blade action.

D. Damper blades shall be internally insulated with expanded polyurethane foam and shall be thermally broken. Blades shall have interlocking edges with compressible seals on both blade edges and ends. Dampers, when closed, shall be guaranteed by the manufacturer not to leak air in excess of 4.9 CFM/sq. ft. at 4" water gauge static pressure at -40 deg. F.

E. Provide normally open damper actuators for generator ventilation. See electrical drawings and specifications. Coordinate with Electrical Contractor prior to ordering equipment.

PART 3 - EXECUTION

3.01 MANUAL VOLUME DAMPERS

A. Install manual volume dampers in each branch duct and for each grille, register, or diffuser as far away from the outlet as possible while still maintaining accessibility to the damper. Install so there is no flutter or vibration of the damper blade(s).

3.02 BACKDRAFT DAMPERS

A. Install dampers at locations indicated on plans and in discharge ductwork of each exhaust fan. Locate dampers as close to louver or hood as possible, providing access door for service. Where damper operators are located inside air stream, provide access doors in adjacent duct for service and repair.

3.03 ACCESS DOORS

A. Install access doors where specified, indicated on the drawings, and in locations where maintenance, service, cleaning or inspection is required. Examples include, but are not limited to motorized dampers, fire and smoke dampers.

B. Heating and cooling coils, filters, valves and control devices needing periodic maintenance.

C. Size and numbers of duct access doors to be sufficient to perform the intended service. Minimum access door size shall be 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, or other size as indicated. Install access doors on both inlet and outlet sides of reheat coils as well as other duct mounted coils.

3.04 WEATHERPROOF LOUVERS

A. Furnish louvers to the General Contractor for mounting in exterior walls. Connect outside air intake duct to the louver, sealing all connections air and water tight.

B. Install insulated metal panel on unused portion of louver. Panels must be sealed weathertight to louver assembly with flashing as required for proper drainage to outside of building.

3.05 SOUND ATTENUATING LOUVERS

A. Furnish louvers to the General Contractor for mounting in exterior walls. Connect outside air intake duct to the louver, sealing all connections air and water tight.

B. Install insulated metal panel on unused portion of louver. Panels must be sealed weathertight to louver assembly with flashing as required for proper drainage to outside of building.

END SECTION

SECTION 15950B

TESTING AND BALANCING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the contract, including General and Supplementary Conditions and Division 1 specification sections apply to work of this Section.

PART 2 - EXECUTION

2.01 GENERAL REQUIREMENTS

A. The Mechanical Contractor shall obtain the services of an NEBB certified independent subcontractor who specializes in and whose business is limited to testing, adjusting and balancing of air and water distribution systems. All tests shall be performed with recently calibrated instruments suitable for the test being performed. This subcontractor shall be responsible for complete testing, adjusting and balancing of the hydronic systems and all new and remodeled air moving systems.

2.02 AIR BALANCE WORK

A. The balancing work shall include, but not be limited to the following items:
   1. The setting and adjusting of all dampers, deflecting vanes, discharge vanes and accessories to achieve indicated air distribution patterns in all parts of the air systems. Air quantities shall be as designated, with allowable error of plus or minus 5%.
   2. The setting and adjusting of all belted fan speeds as may be required to attain proper total CFM deliveries, including the furnishing and installation of additional belts and drives as dictated by field conditions.
   3. The inspection of the function and operation of all automatic controls to ensure proper operation and control cycles.
   4. Submitting a report on each phase of the work.
   5. Air balancing shall be accomplished with duct volume dampers and not dampers at the terminal outlets. Fine balancing will be permitted by means of terminal outlet dampers.
   6. Record all test data in triplicate and submit to Architect.

B. Air System Balance:
   1. Air Handling Equipment
      a. Design Conditions:
         1) CFM supply air.
         2) Static pressure.
         3) Motor HP
         4) CFM fresh air.
         5) Fan RPM.
         6) Fan motor brake horsepower.

b. Installed Equipment:
   1) Manufacturer.
   2) Size.
   3) Arrangement, discharge class.
   4) Motor HP, voltage, phase, cycles, full load amperes.

c. Field Test:
   1) Fan speed.
   2) No load operating amperes.
   3) Fan motor operating amperes.
   4) Calculated BHP.

d. Test for Total Air:
   1) Size of discharge and outside air ducts.
   2) Number of and location of velocity and pressure readings.
   3) Duct average velocity.
   4) Total CFM.

2. Individual Terminal Outlets:
   a. Identify each supply outlet and exhaust as to location area and fan system.
   b. Manufacturer and type.
   c. Size.
   d. Free area, core area or neck area.
   e. Terminal factor.
   f. Required FPM and test velocity.
   g. Required CFM and test results.

3. In addition to the above work, check operation of all automatic temperature control equipment; verify all thermostat, aquastat, airstat, etc., setpoints and operations; and enlist the aid of the control subcontractor to make necessary adjustments where required.

C. Inspecting, Checking and Testing System:

1. Mechanical Contractor shall submit to the owner, in triplicate, at the completion of his work a certified statement signed by a principal of the firm stating that the system has been fully adjusted and balanced in accordance with requirements outlined and that all system components have been checked and tested, adjusted, and is operating properly as noted by plans and specifications. This statement shall be submitted before the system is presented to the Owner for final inspection.

END SECTION

16

DIVISION 16

ELECTRICAL

SECTION 16010

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.
   1. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
      a. NFPA 70 - National Electrical Code.
   2. National Electrical Contractors Association (NECA), current edition.
      a. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting.

1.03 DESCRIPTION OF WORK

A. Furnish and install complete and operable electrical systems as indicated on the drawings and as specified herein

B. Design Requirements:
   1. The table included in this section under Hardware Design Requirements specifies the usage requirements for the hardware and equipment specified in the following sections:
      a. Section 16190 Hangers and Supports for Electrical Systems
      b. Section 16111 Conduit
      c. Section 16130 Boxes

C. Electrical Work Specified Elsewhere:
   1. Every attempt has been made to indicate in these specifications and drawings all work required under Division 16. However, there may be additional specific requirements in the specifications, drawings, or addenda of other trades which pertain to the work of this trade, and any such requirements are hereby made a part of the requirements for this trade.

D. Design Intent:
   1. The Contractor shall furnish and install all the necessary materials, apparatus, and devices to complete the electrical equipment and systems installation herein specified, except such parts as are specifically exempted herein.
   2. If an item is either called for in the specifications or shown on the plans, it shall be considered sufficient for the inclusion of said item in this contract. If a conflict exists within the Specifications or Drawings, the Contractor shall furnish the item, system, or workmanship that is the highest quality, largest, or most closely fits the design intent.
   3. Refer to the General Conditions of the Contract for further clarification of Design Intent.
   4. The details and drawings are diagrammatic. The Contractor shall verify all dimensions at the site and be responsible for their accuracy.

5. All sizes as given are minimums except as noted.
6. Materials and labor shall be new (unless noted or stated otherwise), first class, and workmanlike, and shall be subject at all times to inspections, tests and approval from the commencement until the acceptance of the completed work.
7. Electrical requirements for equipment are based on design data. It shall be the responsibility of the Contractor to verify actual requirements with the provider of the equipment and adjust electrical installation based upon actual requirements.

E. Substitution of Materials:
1. Refer to General Conditions of the Contract.
2. Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the Contractor is responsible for all costs involved in integrating the equipment or accessories into the system and the assigned space and for obtaining the specified performance from the system into which these items are placed.

1.04 RELATED SECTIONS

A. Common Work Results for Electrical are applicable to all Division 16 sections.

1.05 SUBMITTALS

A. Submit shop drawings in accordance with Section 001300.

B. Submittal Requirements for Division 16 Shop Drawings:
1. Submit individual shop drawings for each section requiring submittal.
2. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and/or number, as indicated in the contract documents.
3. Mark dimensions and values in units to match those specified. Include wiring diagrams of electrically powered or controlled equipment.
4. Clearly notate any exceptions taken to these specifications.
5. Do not release equipment for construction until submittal has been reviewed.
6. Failure to comply with these requirements does not relieve the Contractor of responsibility for meeting the project schedule.

C. Review of shop drawings constitutes acceptance of general design only and will not release the Contractor for fulfilling the terms and intent of the contract documents.

D. Shop Drawings shall be prepared and submitted for the following work:
1. Section 16011 - Utility Services
2. Section 16123 - Electrical Conductors and Cables (600 V and Less)
3. Section 16190 - Hangers and Supports for Electrical Systems
4. Section 16111 - Conduit
5. Section 16130 - Boxes
6. Section 16440 – Enclosed Switches
7. Section 16495 – Automatic Transfer Switch
8. Section 16622 – Engine Generator
9. Section 16900 - Process Instrumentation & Control

1.06 FACTORY TESTING

A. Refer to the requirements the individual technical sections.

1.07 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS

A. Submit operation & maintenance manuals and instructions in accordance with Section 001300.

B. Submittal Requirements for Division 16 Operation & Maintenance Manuals and Instructions:
   1. Assemble material in three-ring or post binders, using an index at the front of each volume and tabs for each system or type of equipment. In addition to the data indicated in the General Requirements, include the following information:
      a. Copies of as-built submittals.
      b. Wiring diagrams for electrically powered or controlled equipment
      c. Records of tests performed to certify compliance with system requirements
      d. Certificates of inspection by regulatory agencies
      e. Parts lists for manufactured equipment
      f. Preventive maintenance recommendations
      g. Warranties
      h. Additional information as indicated in the technical specification sections
      i. Test Reports and Demonstration Log:
         1) Permanently record checks and tests and demonstrations.
         2) Submit copy of complete testing or demonstration report no later than 30 days after testing or demonstration is complete.

C. Operation & Maintenance Manuals and Instructions shall be prepared and submitted for the following equipment:
   2. Section 16495/16622 - Automatic Transfer Switch/ Engine Generator
   3. Section 16900 - Process Instrumentation & Control

1.08 QUALITY ASSURANCE

A. All work and materials shall conform to or exceed in every detail the applicable rules and requirements of the Wisconsin State Electrical Code Volumes 1 and 2, the National Electrical Code (ANSI/NFPA 70), other applicable National Fire Protection Association standards, the National Electrical Safety Code, and present manufacturing standards (including NEMA).

B. All work shall be performed under the direction of a State of Wisconsin Licensed Master Electrician.

C. All materials shall be listed by and shall bear the label of an approved electrical testing laboratory. If none of the approved electrical testing laboratories has published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where one of the approved electrical testing laboratories has an applicable system listing and label, the entire system shall be so labeled.

D. The following laboratories are approved for providing electrical product safety testing and listing services as required in these specifications:
   1. Underwriters Laboratories Inc.
   2. Electrical Testing Laboratories, Inc.

E. Certificates And Inspections:
1. Refer to the General Conditions of the Contract.
2. Obtain and pay for all required inspections including but not limited to state or local electrical inspections and fuel tank inspections. Deliver original inspection certificates to the Engineer.

1.09 DESIGN REQUIREMENTS

A. The following table specifies the usage requirements for the hardware and equipment specified in the following sections:
1. Section 16190 Hangers and Supports for Electrical Systems
2. Section 16111 Conduit
3. Section 16130 Boxes

HARDWARE USAGE REQUIREMENTS					
ATMOSPHERE	CONSTRUCTION	CONDUIT	DEVICE BOX	SUPPORTS/HW	NOTES
General, Dry, New Construction	Concealed	RMCS	CB	HD-GS/Galv.	
General, Damp, New Construction	Concealed	RMCS	CB	HD-GS/Galv.	
General, Wet, New Construction	Concealed	RMCS	CB	SS/SS	
Corrosive, Damp, New Construction	Exposed	RNC	CB	AL/SS	

PART 2 - PRODUCTS

2.01 ACCESS PANELS AND DOORS

A. Drywall and Plaster Walls and Ceilings:
1. 16 gauge frame with not less than a 20 gauge hinged door panel, prime coated steel for general applications, stainless steel for use in toilets, showers and similar wet areas, concealed hinges, screwdriver operated cam latch for general application, key lock for use in public areas, UL listed for use in fire rated partitions if required by the application. Use the largest size access opening possible, consistent with the space and the equipment needed service; minimum size is 12 x 12 inch.

2.02 SEALING AND FIRE-STOPPING

A. Refer to Architectural requirements.

B. Sealing and fire stopping of sleeves/openings between conduits, cable trays, wire ways, troughs, cable bus, bus duct, etc. and the structural or partition opening shall be the responsibility of the Contractor whose work penetrates the opening. Individuals skilled in such work shall perform the sealing and fire stopping.

C. Whenever possible, avoid penetrations of fire and smoke rated partitions. When they cannot be avoided, verify that sufficient space is available for the penetration to be effectively fire and smoke stopped.

D. Manufacturers:
   1. 3M, STI/SpecSeal, Tremco, or approved equal.
   2. The same manufacturer shall provide all fire stopping systems.
   3. The Contractor will be responsible for selecting the appropriate UL tested fire stop system for each application required on the project.

E. Use a product that has a rating not less than the rating of the wall or floor being penetrated. Reference architectural drawings for identification of fire and/or smoke rated walls and floors.

F. Contractor shall use fire stop putty, caulk sealant, intumescent wrap strips, intumescent fire stop collars, fire stop mortar or a combination of these products to provide a UL listed system for each application required for this project. Provide mineral wool backing where specified in manufacturer's application detail.

2.03 NON-RATED PENETRATIONS

A. Conduit Penetrations Through Below Grade Walls:
   1. In exterior wall openings below grade, use a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the uninsulated conduit and the cored opening or a water-stop type wall sleeve.

B. Conduit and Cable Tray Penetrations:
   1. At conduit and cable tray penetrations of non-rated interior partitions, floors and exterior walls above grade, use urethane caulk in annular space between conduit and sleeve, or the core drilled opening.

PART 3 - CONSTRUCTION METHODS

3.01 FIELD MEASUREMENTS

A. The Contractor shall obtain from the appropriate trades and review shop drawings for all equipment requiring electrical connections.

B. Field verify all measurements. Do not base electrical installation or equipment locations on the contract drawings.

C. Identify conflicts with the work of other trades prior to installation of electrical system.

D. Electrical installation shall be based upon shop drawing requirements and field verified measurements. Adjust electrical system installation to satisfy field requirements.

3.02 DELIVERY, STORAGE, AND HANDLING

A. Accept electrical equipment on site. Inspect for damage.

B. Protect electrical equipment from weather, corrosion, and entrance of debris.

3.03 INSTALLATION

A. Excavation And Backfill:

1. Perform all excavation and backfill work to accomplish indicated electrical systems installation in accordance with other sections of this specification.

B. Concrete Work:
1. Coordinate the quantity and location of all cast-in-place concrete work with the architectural drawings.
2. All cast-in-place concrete will be performed by the General Contractor unless noted otherwise. Provide all layout drawings, anchor bolts, metal shapes, and/or templates required to be cast into concrete or used to form concrete for the support of electrical equipment.

C. Cutting And Patching:
1. Cutting and patching shall be performed in accordance with the requirements for architectural work. Refer to other sections of these specifications.

D. Building Access:
1. Arrange for the necessary openings in the building to allow for admittance of all apparatus. When the building access was not previously arranged and must be provided by this Contractor, restore any opening to its original condition after the apparatus has been brought into the building.

E. Equipment Access:
1. Install all piping, conduit, ductwork, and accessories to permit access to equipment for maintenance. Coordinate the exact location of wall and ceiling access panels and doors, making sure that access is available for all equipment and specialties. Where access is required in plaster or drywall walls or ceilings, furnish access doors and arrange for installation bt appropriate trades.

F. Working Clearances:
1. Minimum installed equipment working clearances as required by the NEC shall be maintained.
2. Minimum required dedicated electrical equipment space as required by the NEC shall be maintained.
3. Coordinate these requirements with the work of other trades.
4. Identify conflicts with working space requirements prior to installation of equipment.

G. Coordination:
1. Cooperate with other trades in locating work in a proper manner. Should it be necessary to raise or lower or move longitudinally any part of the electrical work to better fit the general installation, such work shall be done at no extra cost to the Owner. The Contractor shall check location of electrical outlets with respect to other installations before installing.
2. Verify that all devices are compatible for the surfaces on which they will be used. This includes, but is not limited to, light fixtures, panel boards, devices, etc. and recessed or semi-recessed heating units installed in/on architectural surfaces.
3. Coordinate all work prior to installation. Any installed work that is not coordinated and that interferes with the work of another trade shall be removed or relocated at no additional cost to the Owner.
4. Verify the integrity of fire or smoke ratings where penetrations are required.

H. Sleeves:
1. Process Equipment Areas:
a. New poured concrete construction: cast in place, Schedule 40, PVC sleeve.
b. All other construction: core drill sleeve openings large enough to insert Schedule 40 PVC sleeve and grout around the sleeve.
c. Floor penetrations:
1) Extend top of sleeve two inches above the floor.
2) Where installation of sleeve in floor is not practical, provide two inch deep housekeeping pad extending three inches around cast in place conduits.
2. Non-Process Equipment Areas:
a. Hollow walls: Schedule 40, PVC sleeves, grout around sleeve in masonry construction.
b. All other Areas: core drill sleeve openings large enough to insert Schedule 40 PVC sleeve and utilize the core drilled opening as the sleeve.
3. Conduit Support:
a. If the pipe penetrating the sleeve is supported by a pipe clamp resting on the sleeve, weld a collar or struts to the sleeve that will transfer weight to the floor structure.

I. Sealing And Firestopping:
1. Fire and/or Smoke Penetrations:
a. Install approved product in accordance with the manufacturer's instructions where a pipe (i.e. cable tray, bus, cable bus, conduit, wire way, trough, etc.) penetrates a fire rated surface.
b. Where fire stop mortar is used to infill large fire-rated floor openings that could be required to support weight, provide permanent structural forming. Fire stop mortar alone is not adequate to support any substantial weight.
2. Non-Rated Surfaces:
a. When the opening is through a non-fire rated wall, floor, ceiling or roof the opening must be sealed using an approved type of material.
b. Install escutcheons or floor/ceiling plates where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces for this paragraph include only those rooms with finished ceilings and the penetration occurs below the ceiling.
c. In exterior wall openings below grade, assemble rubber links of mechanical seal to the proper size for the conduit and tighten in place, in accordance with the manufacturer's instructions.
d. At interior partitions, conduit penetrations are required to be sealed for all areas . Apply sealant to both sides of the penetration in such a manner that the annular space between the conduit sleeve and the conduit is completely filled.

J. Housekeeping and Clean-up
1. On a daily basis, clean up and remove all debris and rubbish resulting from work and repair all damage to new and existing equipment resulting from work.
2. Remove all tools, excess material, and unused equipment from the site when job is complete.

K. General Inspection and Cleaning of Electrical Equipment
1. Inspect for physical damage and abnormal mechanical or electrical conditions.

2. Any item found to be out of tolerance, or in any other way defective as a result of the required testing, shall be reported to the Engineer. Procedure for repair and/or replacement will be outlined. After appropriate corrective action is completed the item shall be re-tested.
3. Compare equipment nameplate information with the Contract Drawings and report any discrepancies.
4. Verify proper auxiliary device operation and indicators.
5. Check tightness of accessible bolted electrical joints. Use torque wrench method.
6. Make a close examination of equipment and remove any shipping brackets, insulation, packing, etc. that may not have been removed during original installation.
7. Make a close examination of equipment and remove any dirt or other forms of debris that may have collected in existing equipment or in new equipment during installation.
8. Vacuum inside of panelboards, switchboards, switchgear, transformer core and coils, horizontal and vertical busducts, MCC's, control panels, and any other similar equipment
9. Clean All Equipment:
    a. Loosen attached particles and vacuum them away.
    b. Remove any remaining packing material adhesives with suitable cleaning solution.
    c. Touch-up factory applied finishes damaged during installation using manufacturer approved means to match original finish.

3.04 TESTING AND START-UP SERVICES

A. Refer to the requirements the individual technical sections.

3.05 TRAINING

A. Refer to the requirements the individual technical sections.

END OF SECTION

SECTION 16011

UTILITY SERVICES

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of the General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the reference thereto.
   1. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards:
      a. ANSI/NFPA 70 - National Electrical Code (NEC) and state amendments thereto, Current Edition.
   2. National Electrical Contractors Association (NECA), Standard of Installation, Current Edition.
   3. National Electrical Manufacturers Association (NEMA), Specifications and Standards, current edition.
   4. Underwriters Laboratories, Inc. (UL), Specifications and Standards, current edition.

1.03 DESCRIPTION OF WORK

A. Provide and install complete and operable utility services as required on the drawings and as specified herein.

B. Payment of Utility Company charges for service will be paid by an allowance of $10,000 which will be adjusted up or down by a change order to the Contract to reflect actual utility company invoices. Contractor handling charges, overhead, and mark-up shall be included in the base bid and are not included under this allowance.

C. Arrange with Electric Utility for permanent and temporary electric service.
   1. Electric Service:
      a. Utility Company: We Energies
      b. System Characteristics:
         1) Facility type: Pump Station.
         2) Required service voltage: 277/480V 3-phase, 4-wire.
         3) Required service size: 600A.

1.04 SHOP DRAWINGS

A. Submit shop drawings in accordance with the Section 001300.

B. The following information shall be submitted specifically for utility services:
   1. Manufacturer literature sufficient in scope to demonstrate compliance with the requirements of this specification.
   2. Documentation required by utility company for approval.

1.05 FACTORY TESTING (NONE)

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS (NONE)

1.07 QUALITY ASSURANCE

A. Service entrance and metering equipment provided under this section shall be UL Listed for the service intended and shall be approved by the utility company.

B. All materials, equipment, and parts shall be new and unused of current manufacture.

C. Contractor shall be responsible for providing all necessary accessories required for a complete and operable system.

PART 2 - PRODUCTS (NONE)

PART 3 - CONSTRUCTION METHODS

3.01 DIVISION OF WORK

A. The Contractor shall be responsible for coordinating conductor marking and color coding requirements with control system equipment supplier(s).

3.02 FIELD MEASUREMENTS

A. Verify existing conditions and dimensions.

B. Verify that service equipment is ready to be connected and energized.

C. Make arrangements with utility company and obtain required inspections before energizing service(s).

D. Coordinate location of utility company facilities to ensure proper access is available.

3.03 DELIVERY, STORAGE, AND HANDLING (NONE)

3.04 INSTALLATION

A. Install service entrance conduit and conductors in accordance with utility company instructions.

B. Install metering equipment in accordance with utility company instructions.

END OF SECTION

SECTION 16111

CONDUIT

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.

1. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
   a. ANSI C80.1 - Electrical Rigid Steel Conduit (ERSC).
   b. ANSI C80.3 - Steel Electrical Metallic Tubing (EMT).
   c. ANSI C80.5 - Electrical Rigid Aluminum Conduit (ERAC).
   d. NFPA 70 - National Electrical Code.
2. American Society for Testing and Materials (ASTM), Specifications and Standards, current edition:
   a. ASTM F2160 - Solid Wall High Density Polyethylene (HDPE) Conduit Based on Controlled Outside Diameter.
   b. ASTM D2239 - Polyethylene (PE) Plastic Pipe (SIDR) Based on Controlled Inside Diameter.
   c. ASTM D3035 - Polyethylene (PE) Plastic Pipe (SDR) Based on Controlled Outside Diameter.
   d. ASTM D3350 - Polyethylene Plastics Pipe and Fittings Materials.
3. National Electrical Contractors Association (NECA), current edition.
   a. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting.
   b. NECA 101 - Standard for Installing Steel Conduit (Rigid, IMC, EMT).
4. National Electrical Manufacturers Association (NEMA), Specifications and Standards, current edition.
   a. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association.
   b. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; National Electrical Manufacturers Association.
   c. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit; National Electrical Manufacturers Association.
   d. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing; National Electrical Manufacturers Association.
   e. NEMA TC 7 - Smooth Wall Coilable Polyethylene Electrical Plastic Conduit.
5. Underwriters Laboratories, Inc. (UL), Specifications and Standards, current edition.
   a. UL 1 - Standard for Flexible Metal Conduit
   b. UL 6 - Electrical Rigid Metal Conduit - Steel.
   c. UL 6A - Standard for Electrical Rigid Metal Conduit - Aluminum and Stainless Steel.

d. UL 651A Type EB and A Rigid PVC Conduit and HDPE conduit.
e. UL 651B Continuous Length HDPE.
f. UL 1660 - Liquid-Tight Flexible Nonmetallic Conduit.
g. UL 2239 - Standard for Safety for Hardware for the Support of Conduit, Tubing, and Cable.

1.03 DESCRIPTION OF WORK

A. Furnish and install complete and operable conduit system as indicated on the drawings, scheduled in Section 16010, and as specified herein.

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300.

B. Submit the following information specifically for conduit:
1. Manufacturer literature sufficient in scope to demonstrate compliance with the requirements of this specification.
2. Clearly identify the types of conduit and fittings proposed.

1.05 FACTORY TESTING - NOT USED

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS- NOT USED

1.07 QUALITY ASSURANCE

A. All materials, equipment, and parts shall be new and unused of current manufacture.

B. System supplier shall be responsible for providing all necessary accessories required for a complete and operable system.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

D. Products: Listed and classified by UL or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.01 GALVANIZED RIGID METAL CONDUIT (TYPE RMCS)

A. Manufacturer: Contractor option.

B. Conduit:
1. Impact and crush resistant mild steel tube with an accurate circular cross section, a uniform wall thickness, a defect free interior surface, and a continuous welded seam.
2. Interior and exterior surfaces thoroughly and evenly coated with zinc using the hot-dip galvanizing process.
3. Top-coated with a compatible organic layer to inhibit white rust and increase corrosion resistance.

4. Factory cut threads, 0.75-inch taper per foot, protected after cutting with an application of molten zinc.

C. Conduit Bodies:
1. Ferrous metal construction electro-galvanized inside and out and coated with aluminum acrylic paint.
2. Tapered, threaded hubs with integral bushing.
3. Stainless steel hardware.
4. Cover constructed of same material with solid gasket.

D. Fittings:
1. Ferrous metal construction electro-galvanized inside and out.
2. Components critical to performance such as set screws, split rings, and locknuts constructed of hardened steel or adequately designed to insure positive bonds.

2.02 RIGID NON-METALLIC CONDUIT (TYPE RNC)

A. Manufacturer:
1. Carlon.
2. Or equal.

B. Conduit:
1. Made from polyvinyl chloride compound (recognized by UL), which includes inert modifiers to improve weatherability and heat distortion.
2. Rated for use with 90 degree C conductors. Material shall comply with NEMA Specification TC-2.
3. The conduit and fittings shall be homogeneous plastic material free from visible cracks, holes or foreign inclusions. The conduit bore shall be smooth and free of blisters, nicks or other imperfections, which could mar conductors or cables.
4. Conduit, fittings and cement shall be produced by the same manufacturer to assure system integrity.
5. Schedule 80 non-metallic conduit shall be used in locations subject to physical damage. Schedule 40 non-metallic conduit may be used in all other locations.

C. Conduit Bodies:
1. Made from polyvinyl chloride compound (recognized by UL), which includes inert modifiers to improve weatherability and heat distortion.
2. Rated for use with 90 degree C conductors. Material shall comply with NEMA Specification TC-3.
3. Stainless steel hardware.
4. Cover constructed of same material with solid gasket.

D. Fittings:
1. Made from polyvinyl chloride compound (recognized by UL), which includes inert modifiers to improve weatherability and heat distortion.
2. Rated for use with 90 degree C conductors. Material shall comply with NEMA Specification TC-3.

2.03 LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT (TYPE LMFC)

A. Manufacturer: CONTRACTOR option.

B. Usage:
1. Use in conjunction with galvanized rigid metal conduit.
2. Use in conjunction with PVC coated galvanized rigid metal conduit.
3. Use in conjunction with rigid aluminum conduit.

C. Conduit:
1. Single strip, helically wound, galvanized steel core inside and outside with smooth interior surface with sunlight resistant thermoplastic jacket suitable for ambient environmental conditions conforming to applicable UL Standards.
2. Jacket shall be positively locked to core to prevent sleeving.
3. All runs of flexible conduit shall be as short as practicable, of the same size as the conduit it extends and with enough slack to reduce the effects of expansion and vibration.

D. Fittings:
1. Where used in conjunction with galvanized rigid metal conduit, connectors shall be malleable iron or steel, electro zinc plated, with insulated throat and taper threaded hub.
2. Where used in conjunction with PVC coated galvanized rigid metal or rigid aluminum conduit connectors shall be malleable iron or steel, electro zinc plated and PVC coated, with insulated throat and taper threaded hub.
3. Particular attention shall be given to maintaining ground bond and firm support through flexible connections.
4. All fittings shall be liquid tight.

2.04 LIQUIDTIGHT FLEXIBLE NON-METALLIC CONDUIT (TYPE LFNC)

A. Manufacturer:
1. Carlon Carflex.
2. Or equal.

B. Usage:
1. Use in conjunction with rigid nonmetallic PVC conduit.

C. Conduit:
1. Conduit shall have a smooth inner surface with integral reinforcement within the conduit wall.
2. Conduit shall be designated as a Type LFNC-B (or FNMC-B), listed to UL standard UL1660 and suitable for use at conduit temperatures of 80 degrees C (dry), 60 degrees C (wet and oil resistant).
3. Conduit shall be flame resistant and when used with listed fittings, approved for the installation of electrical conductors.
4. Conduit shall be installed in accordance with applicable sections of the NEC and/or local electrical codes.
5. Conduit shall be marked OUTDOOR for outdoor applications exposed to sunlight and weathering conditions and marked DIRECT BURIAL for direct burial applications.
6. The National Evaluation Service, Inc shall evaluate conduit for installation within a three-hour or less fire-resistive floor/ceiling and two-hour fire-resistive wall construction.

D. Fittings:

1. Molded from high strength, chemical resistant, glass filled thermoplastic.
2. Fittings shall be listed for the use with liquid tight flexible nonmetallic conduit and shall be marked LFNC-B (FNMC-B).
3. Fittings uses for direct burial applications shall be listed for wet locations.
4. Particular attention shall be given to maintaining ground bond and firm support through flexible connections.
5. All fittings shall be liquid tight.

PART 3 - CONSTRUCTION METHODS

3.01 FIELD MEASUREMENTS

A. The Contractor shall obtain from the appropriate trades and review shop drawings for all equipment requiring electrical connections. Conduit rough-in shall be based upon shop drawing requirements.

B. The Contractor shall be responsible for coordinating conduit location and rough-in with actual equipment conditions and requirements.

C. Field verify all measurements. Do not base conduit rough-in or equipment locations on the contract drawings.

D. Identify conflicts with the work of other trades prior to installation of electrical equipment and conduit work.

E. Adjust conduit system installation to satisfy field requirements.

3.02 DELIVERY, STORAGE, AND HANDLING

A. Accept conduit on site. Inspect for damage.

B. Protect conduit from corrosion and entrance of debris.

C. Store conduit above grade. Protect from environment with suitable covering.

D. Protect PVC and PVC coated conduit from sunlight.

3.03 INSTALLATION

A. General:
1. Install conduit in accordance with NECA "Standard Practices for Good Workmanship in Electrical Contracting", all requirements of the NEC, and manufacturer recommended practices.
2. Arrange conduit to maintain headroom and present neat appearance.
3. Design raceway systems to minimize the number of fittings, couplings, kicks, and offsets.
4. Raceways located above lowest floor level:
   a. Route conduit parallel and perpendicular to walls.
   b. All raceways shall be level and straight.
   c. Vertical conduits shall be plumb.
5. Raceways located in or under lowest level floor:
   a. Route conduit in and under slab from point-to-point.

b. Do not cross conduits in slab.

6. Do not use flexible conduit in place of bends, conduit bodies, or expansion fittings.
7. Flexible conduit shall be used at all equipment terminations. Maximum length of 24-inches unless specifically allowed otherwise by Engineer based upon field conditions.
8. Do not use cords for equipment connections unless specifically allowed otherwise by Engineer based upon field conditions.

B. Raceway sizing:
1. Size raceways as indicated on drawings.
2. Where raceways sizes are not indicated on drawings, size in accordance with NEC requirements. Minimum size 3/4-inch.
3. Exposed conduit runs not longer than 10-feet in length and terminating at a single device may be 1/2-inch unless prohibited by NEC.

C. Raceway Installation:
1. Maintain adequate clearance between conduit and piping.
2. Maintain 12-inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
3. Cut conduit square using saw or pipe cutter; de-burr cut ends.
4. Bring conduit to shoulder of fittings; fasten securely.
5. Use conduit hubs to fasten conduit to NEMA 4X and NEMA 12 boxes.
6. Install no more than equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic factory elbows for bends in metal conduit larger than 2-inch size.
7. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.
8. Suitable pull string shall be installed in each empty conduit, sleeves and nipples excepted.
9. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
10. Remove all debris and moisture from raceways prior to installing conductors.
11. Ground and bond conduit under provisions of Section 26 05 26.
12. Identify conduit under provisions of Section 26 05 53.
13. Install plastic coated conduit in accordance with manufacturer's instructions. All 90 degree bends shall be manufactured elbows. Touch-up PVC coating after installation.
14. All field cut threads shall be coated with Thomas & Betts Kopr-Shield prior to assembly.

D. Structural Coordination:
1. Suitable fittings, designed and listed for the purpose, shall be used to accommodate expansion and deflection where conduit crosses seismic, control and expansion joints.
2. Install conduit to preserve fire resistance rating of partitions and other elements.
3. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation.
4. Where conduit passes between areas subject to variable temperatures, seal conduits to prevent air interchange and condensation formation. Use conduit fitting specifically manufactured for this purpose.

E. Raceway Support:
1. General:
a. Arrange supports to prevent misalignment during wiring installation.
b. Do not permanently support conduit with wire or perforated pipe straps.

c. Remove wire used for temporary supports.
d. Do not attach conduit to ceiling support wires.
e. Channel, rod, and hardware shall comply with the requirements of Section 16190.

2. Hardware:
   a. Construct conduit support rack with channel and rod to support conduits not supported from structure.
   b. Support conduit with channel anchored to structure when conduit offset from structure is required.
   c. Secure conduits to channel with pipe straps.
   d. Support conduit from structure when conduit offset from structure is not required.
   e. Secure conduits directly to structure with one-hole strap and conduit spacer.

F. Conduit Separation:
1. Separate conduit systems shall be used for the following circuit categories:
   a. 120-volt power circuits.
   b. 480-volt power circuits.
   c. 120-volt control circuits.
   d. 24 VDC analog control circuits.
   e. Intrinsically safe control circuits.
   f. UTP control cables.
   g. Manufacturer supplied cables (for example, magnetic flow meter cables).
   h. Radio frequency coaxial cables (for example, antenna cables).
2. The contract drawings show individual homerun equipment connections. The Contractor may combine circuits of common types (as identified above) into single conduits provided the following conditions are met:
   a. NEC requirements for conductor de-rating are satisfied.
   b. Conduit fill does not exceed thirty percent. Ten percent fill shall be reserved for future use.
   c. No more than eight 24VDC analog circuits are combined in a single conduit, unless specifically stated otherwise on the drawings.

3.04 TESTING AND START-UP SERVICES - NOT USED

3.05 TRAINING - NOT USED

END OF SECTION

SECTION 16123

ELECTRICAL CONDUCTORS AND CABLES (600 V AND LESS)

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.
   1. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
      a. NFPA 70 - National Electrical Code.
   2. ASTM International, originally known as the American Society for Testing and Materials, Specifications and Standards, current edition:
      a. ASTM B800-05 Standard Specification for 8000 Series Aluminum Alloy Wire for Electrical Purposes-Annealed and Intermediate Tempers
      b. ASTM B801-99 Standard Specification for Concentric-Lay-Stranded Conductors of 8000 Series Aluminum Alloy for Subsequent Covering or Insulation
   3. National Electrical Contractors Association (NECA), current edition.
      a. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting.
   4. Underwriters Laboratories, Inc. (UL), Specifications and Standards, current edition.
      a. U.L. 44 - Rubber-Insulated Wires and Cables.
      b. U.L. 50 - Enclosures for Electrical Equipment.
      c. U.L. 83 - Thermoplastic-Insulated Wires.
      d. U.L. 514B - Conduit, Tubing, and Cable Fittings.
      e. U.L. 758 - 105 degree C Appliance Wiring Materials.
      f. U.L. 854 - Service Entrance Cables.
      g. U.L. 1063 - Machine-Tool Wires and Cables.
      h. U.L. 1277 - Type TC Power and Control Tray Cables.
      i. U.L. 1569 - Metal-Clad Cables
      j. UL 1581 - Vertical Tray.

1.03 DESCRIPTION OF WORK

A. Furnish and install complete and operable wire and cable systems as indicated on the drawings and as specified herein.

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Section 001300.

B. The following information shall be submitted specifically for wire and cable:
   1. Literature sufficient in scope to demonstrate compliance with the requirements of this specification.
   2. Clearly identify the types of wire and cable proposed.

1.05 QUALITY ASSURANCE

A. Products: Listed and classified by UL or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

B. Wire and cable manufacturers shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development and production in accordance with ISO 9001.

C. All materials, equipment, and parts shall be new and unused of current manufacture.

D. Contractor shall be responsible for providing all necessary accessories required for a complete and operable system.

PART 2 - PRODUCTS

2.01 WIRE AND CABLE - GENERAL PURPOSE (600V, COPPER)

A. Manufacturer: Contractor option.

B. General:
1. THWN/THHN general purpose building wire insulated with polyvinyl chloride (PVC) and covered with protective sheath of nylon intended for lighting and power circuits at 600 volts or less, in residential, commercial and industrial buildings.
2. The wire shall be suitable for 90 degree C maximum continuous conductor temperature in dry locations and 75 degree C in wet locations and listed by Underwriters Laboratories for use in accordance with the National Electrical Code.

C. Conductors:
1. Class B or Class C stranded, annealed uncoated copper per UL Standard 83 or 1063.

D. Insulation:
1. Each conductor shall be insulated with PVC and sheathed with nylon complying with the requirements of UL Standard 83 for Types THHN/THWN and UL Standard 1063 for Type MTW and CSA C22.2 No. 75 for T90 Nylon.
2. Types THWN/THHN shall comply with the optional Gasoline and Oil Resistant rating of UL Standard 83. The insulation shall also comply with UL requirements for 105 degree C Appliance Wiring Material.
3. The average thickness of PVC insulation, for a given conductor size, shall be as specified in UL Standard 83 for Types THWN or THHN. The minimum thickness at any point, of the PVC insulation, shall be not less than 90 percent of the specified average thickness.
4. The minimum thickness at any point of the nylon sheath shall be as specified in UL Standard 83 for Types THWN or THHN.
5. The PVC insulation shall be applied tightly to the conductor and shall be free-stripping.

E. Identification:
1. The wire shall be identified by surface marking indicating manufacturer's identification, conductor size and metal, voltage rating, UL Symbol, type designations and optional ratings. The wire shall also be identified as C(UL) Type T90 Nylon or TWN75, FT1.

F. Tests:
1. Wire shall be tested in accordance with the requirements of UL Standard 83 for Types THWN or THHN wire and for the optional Gasoline and Oil Resistant listings; as Type MTW to UL Standard 1063 (stranded items); as AWM to UL Standard 758 (stranded items); and as C(UL) Type T90 Nylon or TWN75.

G. Usage:
1. General use power wiring, minimum size No.12 AWG.
2. General use control wiring, minimum size No.14 AWG.

2.02 SHIELDED INSTRUMENTATION CABLE (300V)

A. Manufacturer: CONTRACTOR option.

B. General:
1. Power limited tray cable - two conductor, No.16 AWG (7x24) bare copper, PVC insulation, overall shield with No.18 AWG (7x26) tinned copper drain wire, PVC jacket with nylon ripcord.

C. Electrical Characteristics:
1. Max. Operating voltage: 300Vrms.
2. Conductor DC resistance at 20 deg. C: 3.7 Ohms/1000 ft.
3. Shield DC resistance at 20 degrees C: 5.1 Ohms/1000 ft.
4. Capacitance between conductors at 1 kHz: 61 pF/ft.
5. Capacitance between conductor and shield at 1 kHz: 114 pF/ft.
6. Inductance: 0.19 uH/ft.

D. Physical Characteristics:
1. Temperature rating: -30 to 105 degrees C.
2. Insulation material: PVC.
3. Average insulation thickness: 0.016-in.
4. Jacket material: Sun resistant PVC.
5. Jacket thickness: 0.037-in. nominal.
6. Shield: Aluminum/Polyester, 100 percent coverage.
7. Overall lay length: 2-in. (6 twists/ft).
8. Maximum pulling tension: 94 lbs.
9. Minimum bend radius: 2.6-in.
10. Flame resistance: UL 1581 vertical tray.

E. Usage:
1. Instrumentation cable.

PART 3 - CONSTRUCTION METHODS

3.01 FIELD MEASUREMENTS

A. Field verify all measurements. Do not base electrical installation or equipment locations on the contract drawings.

B. Identify conflicts with the work of other trades prior to installation of electrical system.

C. Adjust electrical system installation to satisfy field requirements.

3.02 DELIVERY, STORAGE, AND HANDLING

A. Accept electrical equipment on site. Inspect for damage.

B. Protect electrical equipment from weather, corrosion, and entrance of debris.

3.03 INSTALLATION

A. Pre-Installation:
1. Verify that interior of building has been protected from weather.
2. Verify that mechanical work likely to damage wire has been completed.
3. Completely and thoroughly swab raceway prior to installation.
4. Verify that field measurements are as shown on drawings.
5. Wire and cable routing shown on drawings is approximate unless dimensioned. Route wire and cable to satisfy project conditions.
6. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.
7. Determine required separation between cable and other work.
8. Determine cable routing to avoid interference with other work.
9. Any single conduit or raceway utilized for a feeder circuit shall contain only power conductors of a single feeder circuit. Do not combine feeder circuits without engineer's written approval.
10. Contract drawings indicate individual homerun equipment connections. Contractor may combine branch circuits of common types in single conduits provided the following conditions are met:
    a. NEC requirements for conductor de-rating are satisfied.
    b. Conduit fill does not exceed thirty percent. Ten percent fill shall be reserved for future use.
11. No more than eight 24VDC analog circuits may be combined in a single conduit unless specifically stated otherwise on the drawings.

B. Conductor Sizing:
1. Conductor sizes are based on copper unless otherwise noted.
2. Use conductor not smaller than No.12 AWG for power and lighting circuits.
3. Use No.10 AWG conductors for 20 ampere, 120-volt branch circuits longer than 75 feet.
4. Where circuit wiring length exceeds length identified on the feeder schedule, increase wire size as needed to maintain a maximum voltage drop of three percent.
5. Use conductor not smaller than No.14 AWG for control circuits.
6. Unless shown otherwise on the contract drawings, power wiring shall be No.12 AWG.

C. Wire Pulling:
1. Pull all conductors into raceway at same time.
2. No.4 AWG and larger wire and power cables shall lubricated with pulling lubricant to reduce pulling tension and abrasion damage. The lubricant shall be water or wax based containing no oils or greases that may adversely affect cable jackets.
3. The minimum bend radius and maximum pulling tension ratings of the wire and cable shall not be exceeded.

D. Splices and Terminations:
   1. Splices and terminations shall not be made within raceways.
   2. Clean conductor surfaces before splicing or terminating.
   3. Make splices, taps, and terminations to carry full amp capacity of conductors with no perceptible temperature rise.
   4. Insulated spring wire connectors may be used to splice 120V power circuits.
   5. Control, communication, and data transmission wire and cable shall not be spliced.
   6. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
   7. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
   8. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

E. Motors:
   1. Motor wiring to motors less than 10 horsepower shall be spliced and terminated with fully insulated crimp-on end cap with a layer of self-vulcanizing rubber tape, followed by five layers of vinyl electrical tape. "SkotchLocks" and similar devices shall not be used.
   2. Motor wiring to motors 10 horsepower or larger shall be spliced and terminated with crimp-on ring terminal lugs, brass nuts, bolts and washers with a layer of self-vulcanizing rubber tape, followed by five layers of vinyl electrical tape. "SkotchLocks" and similar devices shall not be used.

F. Unshielded power cables:
   1. Unshielded power cables shall be spliced and terminated with crimp-on ring terminal lugs, brass nuts, bolts and washers with a layer of self-vulcanizing rubber tape, followed by five layers of vinyl electrical tape. "SkotchLocks" and similar devices shall not be used.

3.04 TESTING AND START-UP SERVICES

A. Inspect wire for physical damage and proper connection.

B. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.

C. Verify continuity of each conductor.

D. Feeder or branch circuits with ampacity greater than 100 amperes shall be tested after installation to measure insulation resistance of each conductor.

E. All equipment shall be disconnected and the wire ends shall be cleaned and dried.

F. Connect Megohmeter between conductor and a grounded point in the enclosure and energize until the reading stabilizes.

3.05 TRAINING - NOT USED

END OF SECTION

SECTION 16130

BOXES

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.
   1. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
      a. NFPA 70 - National Electrical Code.
   2. National Electrical Contractors Association (NECA), current edition.
      a. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting.
      b. NECA 101 - Standard for Installing Steel Conduit (Rigid, IMC, EMT).
   3. National Electrical Manufacturers Association (NEMA), Specifications and Standards, current edition.
      a. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association.
      b. ANSI/NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
      c. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
   4. Underwriters Laboratories, Inc. (UL), Specifications and Standards, current edition.

1.03 DESCRIPTION OF WORK

A. Furnish and install complete and operable box systems as indicated on the drawings, scheduled in Section 16010, and as specified herein.

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300.

B. Submit the following information specifically for boxes:
   1. Manufacturer literature sufficient in scope to demonstrate compliance with the requirements of this specification.
   2. Clearly identify the types of boxes proposed.

1.05 FACTORY TESTING - NOT USED

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS- NOT USED

1.07 QUALITY ASSURANCE

A. All materials, equipment, and parts shall be new and unused of current manufacture.

B. System supplier shall be responsible for providing all necessary accessories required for a complete and operable system.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

D. Products: Listed and classified by UL or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.01 OUTLET BOXES

A. Sheet Metal Outlet Boxes:
1. Galvanized steel, with stamped knockouts.
2. Gangable, suitable for number of devices shown.
3. Suitable for flush mounting with drywall, FRP panel, masonry block, and poured concrete wall and ceiling finishes.

B. Luminaire and Equipment Supporting Boxes:
1. Rated for weight of equipment supported; include 3/8-inch male fixture studs where required.

C. Cast Boxes:
1. Cast ferralloy or aluminum, deep type, gasketed cover, threaded hubs.
2. Suitable for surface or flush mounting with drywall, FRP panel, masonry block, and poured concrete wall and ceiling finishes.

2.02 PULL AND JUNCTION BOXES

A. General:
1. Pull boxes and junction boxes shall be minimum 4 inch square (100 mm) by 2 1/8th inches (54 mm) deep for use with 1 inch (25 mm) conduit and smaller. On conduit systems using 1 1/4 inch (31.75 mm) conduit or larger, pull and junction boxes shall be sized per NEC but not less than 4 11/16 inch square (117 mm).
2. For telecommunication, fiber optic, security, and other low voltage cable installations the NEC box size requirements shall apply. All boxes, used on telecommunication, security, other low voltage and fiber optic systems with conduits of 1 1/4" and larger, shall be sized per the NEC conduit requirements. For determining box size, the conduit is the determining factor not the wire size.

B. Sheet Metal Boxes: code gauge galvanized steel, screw covers, flanged and spot welded joints and corners.

C. Boxes Larger than 12 Inches (300 mm) in any dimension shall have a hinged cover, be rated NEMA 4X, and constructed of stainless steel.

D. Cast Metal Boxes for Outdoor and Wet Location Installations: Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as rain-tight. Galvanized cast iron or aluminum box and cover with ground flange, neoprene gasket, and stainless steel cover screws.

E. Cast Metal Boxes for Hazardous Locations: Type 7, cast malleable iron with drilled and tapped conduit entrance. Cast malleable iron cover, non-hinged with Type 316 stainless steel screws and gasketed.

F. Cast Metal Boxes for Underground Installations: Type 4, inside flanged, recessed cover box for flush mounting, UL listed as raintight. Hot dipped galvanized cast iron box and plain cover with neoprene gasket and stainless steel cover screws. Cover Legend: ELECTRIC.

G. Fiberglass Handholes for Underground Installations: Die- molded with pre-cut 6 x 6 inch (150 x 150 mm) cable entrance at center bottom of each side; fiberglass weatherproof cover with non-skid finish.

H. Box extensions and adjacent boxes within 48" of each other are not allowed for the purpose of creating more capacity.

I. Junction boxes 6" x 6" or larger size shall be without stamped knock-outs.

J. Wireways shall not be used in lieu of junction boxes.

PART 3 - CONSTRUCTION METHODS

3.01 FIELD MEASUREMENTS

A. The Contractor shall obtain from the appropriate trades and review shop drawings for all equipment requiring electrical connections. Box rough-in shall be based upon shop drawing requirements.

B. The Contractor shall be responsible for coordinating box location and rough-in with actual equipment conditions and requirements.

C. Field verify all measurements. Do not base box rough-in or equipment locations on the contract drawings.

D. Identify conflicts with the work of other trades prior to installation of electrical equipment and conduit work.

E. Adjust box locations to satisfy field requirements.

3.02 DELIVERY, STORAGE, AND HANDLING

A. Accept boxes on site. Inspect for damage.

B. Protect boxes from corrosion and entrance of debris.

C. Store boxes above grade. Protect from environment with suitable covering.

3.03 INSTALLATION

A. General:

1. Install conduit in accordance with NECA "Standard Practices for Good Workmanship in Electrical Contracting", all requirements of the NEC, and manufacturer recommended practices.

B. Box Installation:
1. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
2. Install electrical boxes to maintain headroom and to present neat mechanical appearance.
3. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
4. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.
5. Use flush mounting outlet boxes in all areas.
6. Do not install flush mounting boxes back-to-back in walls; provide minimum 6-inch separation. Provide minimum 24 inches separation in acoustic rated walls.
7. Use gang box where more than one device is mounted together. Do not use sectional box.
8. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose. Include installation within 10 feet of location shown.
9. Position outlet boxes to locate luminaires as shown on lighting plans.
10. Adjust flush-mounting outlets to make front flush with finished wall material.
11. Install knockout closure in unused box opening.

C. Structural Coordination:
1. Install boxes to preserve fire resistance rating of partitions and other elements.
2. Install flush mounting box without damaging wall insulation vapor barrier or reducing its effectiveness. Provide vapor box or vapor barrier hat for each box flush mounted in an exterior wall.
3. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
4. Coordinate mounting heights and locations of outlets mounted above counters, benches and backsplashes.

D. Box Support:
1. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
2. Use stamped steel bridges to fasten flush mounting outlet box between studs.
3. Use adjustable stainless steel channel fasteners for hung ceiling outlet box.
4. Do not fasten boxes to ceiling support wires.
5. Support boxes independently of conduit.

3.04 TESTING AND START-UP SERVICES - NOT USED

3.05 TRAINING - NOT USED

END OF SECTION

SECTION 16141

WIRING DEVICES

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of the General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.
   1. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
      a. NFPA70 - National Electrical Code.
      b. ANSI/NFPA 820 - Standard for Fire Protection in Wastewater Treatment and Collection Facilities.
   2. National Electrical Contractors Association (NECA), Standard of Installation, current edition.
   3. National Electrical Manufacturers Association (NEMA), Specifications and Standards, current edition.
      a. NEMA WD 1 - General Purpose Wiring Devices.
      b. NEMA WD 6 - Wiring Device Configurations.
   4. Underwriters Laboratories, Inc. (UL), Specifications and Standards, current edition.

1.03 DESCRIPTION OF WORK

A. Provide and install complete and operable wiring devices as required on the drawings and as specified herein.

1.04 SHOP DRAWINGS

A. Submit shop drawings in accordance with the Section 01300.

B. The following information shall be submitted specifically for wiring devices:
   1. Manufacturer literature sufficient in scope to demonstrate compliance with the requirements of this specification.
   2. Clearly identify the types of wiring devices proposed.

1.05 QUALITY ASSURANCE

A. All materials, equipment, and parts shall be new and unused of current manufacture.

B. Contractor shall be responsible for providing all necessary accessories required for a complete and operable system.

C. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

D. Manufacturer shall specialize in manufacture of products specified in this Section with minimum three years experience.

PART 2 - PRODUCTS

2.01 120V SPECIFICATION GRADE WALL SWITCHES

A. Single Pole Switch:
   1. Hubbell.
   2. Or equal.

B. Double Pole Switch:
   1. Hubbell.
   2. Or equal.

C. Three-way Switch:
   1. Hubbell.
   2. Or equal.

2.02 120V SPECIFICATION GRADE RECEPTACLES

A. Duplex Convenience Receptacle:
   1. Hubbell.
   2. Or equal.

B. GFCI Receptacle:
   1. Hubbell.
   2. Or equal.

2.03 WALL PLATES

A. Wall plates shall be installed as follows:
   1. Use smooth stainless steel plates for receptacles and switches in sheet steel or PVC boxes.
   2. Use multi-screw gasketed cast plate where cast outlet boxes are required. Covers shall not be attached by using a single screw mounting into the wiring device, but shall be attached by mounting directly to the box.
   3. Use Crouse Hinds WLRS or WLRD wet location covers for receptacles identified as "WP" which are located inside structures.
   4. Use aluminum or cast metal cover rated for "Constant Use" for receptacles identified as "WP" and that are exposed to the weather.
   5. Use Crouse-Hinds OS185 cover for all switches identified as "WP".

PART 3 - CONSTRUCTION METHODS

3.01 DIVISION OF WORK

A. The Contractor shall have overall system responsibility and shall provide all materials and labor necessary provide a complete and operable system and comply with all requirements of this section.

B. The Contractor shall be responsible for coordinating device locations with actual equipment conditions and requirements.

3.02 FIELD MEASUREMENTS

A. Field verify all measurements. Do not base exact wiring device locations on the contract drawings.

B. Adjust location of wiring devices to satisfy field requirements.

3.03 INSTALLATION

A. Wiring Device Installation:
1. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
2. Provide extension rings to bring outlet boxes flush with finished surface.
3. Clean debris from outlet boxes.
4. Install products in accordance with manufacturer's instructions.
5. Install devices plumb and level.
6. Install switches with OFF position down.
7. Install receptacles with grounding pole on top.
8. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
9. Install plates on switch, receptacle, and blank outlets in all areas.
10. Connect wiring devices by wrapping conductor around screw terminal.
11. Provide stainless steel hardware.
12. Install wall switch 46 inches above finished floor.
13. Install convenience receptacle 18 inches above finished floor.
14. Install convenience receptacle 6 inches above counter.
15. Adjust devices and wall plates to be flush and level.

B. Structural Coordination:
1. Verify outlet boxes are installed at proper height.
2. Verify wall openings are neatly cut and will be completely covered by wall plates.
3. Verify floor boxes are adjusted properly.

3.04 TESTING AND STARTUP SERVICES

A. Inspect each wiring device for defects.

B. Operate each wall switch with circuit energized and verify proper operation.

C. Verify that each receptacle device is energized.

D. Test each receptacle device for proper polarity.

E. Test each GFCI receptacle device for proper operation.

END OF SECTION

SECTION 16170

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.

1. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
   a. NFPA 70 - National Electrical Code.
   b. ANSI/NFPA 99 - Health Care Facilities.
2. National Electrical Contractors Association (NECA), current edition.
   a. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting.
3. National Electrical Manufacturers Association (NEMA), Specifications and Standards, Current Edition.
4. Underwriters Laboratories, Inc. (UL), Specifications and Standards, Current Edition.
5. Institute of Electrical and Electronics Engineers (IEEE), Specifications and Standards, current edition:
   a. IEEE 837 - Standard for Qualifying Permanent Connections Used in Substation Grounding.

1.03 DESCRIPTION OF WORK

A. Furnish and install complete and operable grounding and bonding systems as indicated on the drawings and as specified herein.

1.04 RELATED SECTIONS - NOT USED

1.05 SUBMITTALS - NOT USED

1.06 FACTORY TESTING - NOT USED

1.07 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS- NOT USED

1.08 QUALITY ASSURANCE

A. Measure ground resistance from system neutral connection at service entrance to convenient ground reference point using suitable ground testing equipment. Resistance shall not exceed 2 ohms. Additional grounding electrodes shall be used to satisfy ground resistance requirements where required by earth conditions.

PART 2 - PRODUCTS

2.01 ROD ELECTRODE

A. Material: Copper-clad steel.

B. Diameter: 3/4-inch minimum.

C. Length: 10-feet minimum. Rod shall be driven at least 9.5-feet deep.

D. Use one or more ground rods to obtain the minimum specified ground resistance. This applies to manholes, padmount switches, transformers, service entrances, and all other equipment requiring a supplemental grounding electrode. Minimum of three ground rods shall be used to ground the service entrance as indicated on plans.

2.02 MECHANICAL CONNECTORS

A. The mechanical connector bodies shall be manufactured from high strength, high conductivity cast copper alloy material. Bolts, nuts, washers and lockwashers shall be made of silicon bronze and supplied as a part of the connector body and shall be of the two bolt type.

B. Split bolt connector types are not allowed.

C. The connectors shall meet or exceed UL 467 and be clearly marked with the catalog number, conductor size and manufacturer.

2.03 COMPRESSION CONNECTORS

A. The compression connectors shall be manufactured from pure wrought copper. The conductivity of this material shall be no less than 99 percent.

B. The connectors shall meet or exceed the performance requirements of IEEE 837, latest revision.

C. The installation of the connectors shall be made with a compression, tool and die system, as recommended by the manufacturer of the connectors.

D. The connectors shall be clearly marked with the manufacturer, catalog number, conductor size and the required compression tool settings.

E. Each connector shall be factory filled with an oxide-inhibiting compound.

2.04 EXOTHERMIC CONNECTIONS

A. Select the appropriate kit for specific types, sizes, and combinations of conductors and other items to be connected. Field personnel shall be trained in execution of welds.

2.05 WIRE

A. Material: Stranded copper (aluminum not permitted).

B. Grounding Electrode Conductor: Size as shown on drawings, specifications or as required by NFPA 70, whichever is larger.

C. Manhole and Vault Bonding: No. 4/0 minimum.

D. Feeder and Branch Circuit Equipment Ground: Size as shown on drawings, specifications or as required by NFPA 70, whichever is larger. Differentiate between the normal ground and the isolated ground when both are used on the same facility.

PART 3 - CONSTRUCTION METHODS

3.01 FIELD MEASUREMENTS

A. Field verify all measurements. Do not base electrical installation or equipment locations on the contract drawings.

B. Identify conflicts with the work of other trades prior to installation of electrical system.

C. Adjust electrical system installation to satisfy field requirements.

3.02 INSTALLATION

A. General:
1. Verify that final backfill and compaction has been completed before driving rod electrodes.
2. Install products in accordance with manufacturer instructions.
3. Mechanical connections shall be accessible for inspection and checking. No insulation shall be installed over mechanical ground connections.
4. Ground connection surfaces shall be cleaned and all connections shall be made so that it is impossible to move them.
5. Attach grounds permanently before permanent building service is energized.
6. Install rod electrodes at locations indicated or as required by local code, whichever requires the most rods. Install additional rod electrodes as required to achieve specified resistance to ground.
7. Connect grounding electrode conductor and reinforcing steel in foundation footing. Bond steel together.
8. Bond all conductive components to meet Regulatory Requirements.
9. Bond together metal siding not attached to grounded structure; bond to ground.
10. All separate ground wires shall be enclosed in rigid galvanized steel conduit and bonded at both ends to the rigid galvanized steel conduit with an approved fitting.

B. Less than 600 volt system grounding:
1. Supplementary Grounding Electrode: Use driven ground rod on exterior of building.
2. Copper grounding electrode conductor shall be sized as indicated or as required by NEC, whichever is larger and shall be extended from secondary service system neutral to street side of water meter, building steel, ground rod, and any concrete encased electrodes. Bonding jumper shall be installed around water meter. Install conductor in separate rigid conduit. Bond conduit as described above.
3. Receptacle Grounding: All receptacles installed shall have a separate grounding contact.
4. Bond together system neutrals, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.
5. Bond together each metallic raceway, pipe, duct and other metal objects.

6. Equipment Grounding Conductor: Separate, insulated green conductor shall be installed within each raceway and cable tray, sized per NEC or as indicated in the contract documents whichever is larger. Terminate each end on suitable lug, bus, enclosure or bushing, per NEC. Install a ground wire from each device to the respective enclosure.

3.03 TESTING AND START-UP SERVICES

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

3.04 TRAINING - NOT USED

END OF SECTION

SECTION 16190

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.
   1. American Iron and Steel Institute (AISI), Specifications and Standards, current edition.
   2. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
      a. NFPA 70 - National Electrical Code.
   3. American Society for Testing and Materials (ASTM), Specifications and Standards, current edition:
      a. ASTM A653 - General Requirements for Steel Sheet, Zinc-Coated Galvanized by the Hot-Dip Process.
      b. ASTM A1011 - Specification for Steel Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Ally and High-Strength Low Alloy with Improved Formability (Formerly ASTM A570).
      c. ASTM F1136 - Standard Specification for Chromium/Zinc Corrosion Protective Coatings for Fasteners.
      d. ASTM A907 - Standard Specification for Steel, Sheet, and Strip, Heavy-Thickness Coils, Carbon, Hot-Rolled, Structural Quality.
      e. ASTM B633 - Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
   4. National Electrical Contractors Association (NECA), current edition.
      a. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting.
      b. NECA 101 - Standard for Installing Steel Conduit (Rigid, IMC, EMT).
   5. Metal Framing Manufacturers Association (MFMA), Specifications and Standards, current edition.

1.03 DESCRIPTION OF WORK

A. Furnish and install supporting devices as indicated on the drawings, scheduled in Section 16010, and as specified herein.

1.04 SUBMITTALS

A. Submit shop drawings in accordance with section 001300.

B. The following information shall be submitted specifically for supporting devices:
   1. Submit outline drawings and dimensions for equipment support racks.

1.05 QUALITY ASSURANCE

A. Bolted framing channels and fittings shall have the manufacturers name, part number, and material heat code identification number stamped in the part itself for identification. Material certification sheets and test reports must be made available by the manufacturer upon request

B. Stainless steel bolted framing parts shall be stamped to identify the material. Material certification sheets and test reports must be made available by the manufacturer upon request.

C. All materials, equipment, and parts shall be new and unused of current manufacture.

D. Contractor shall be responsible for providing all necessary accessories required for a complete and operable system.

PART 2 - PRODUCTS

2.01 STRUT, CHANNELS, AND CONNECTORS

A. Manufacturers:
1. Cooper B-Line, Inc.
2. or equal.

B. General:
1. Strut shall be 1-5/8-inches wide in varying heights and welded combinations as required to meet load capacities and designs indicated on the drawings.

C. Materials and Finish:
1. Aluminum: Strut shall be manufactured of extruded aluminum alloy 6063-T6. All fittings and hardware shall be zinc plated according to ASTM B633 (SC3 for fittings, SC1 for threaded hardware) for indoor use only. For outdoor use, all fittings and hardware shall be stainless steel Type 304.
2. Hot-dip Galvanized Steel: Strut shall be made from steel meeting the minimum mechanical properties of ASTM A1011 SS, Grade 33 and shall be hot-dip galvanized after fabrication in accordance with ASTM A123. Fittings shall be manufactured from steel meeting the minimum requirements of ASTM A907 SS, Grade 33, and hot-dip galvanized after fabrication in accordance with ASTM A123. All hardware shall be stainless steel Type 304 or chromium zinc ASTM F1136 Gr. 3. All hot-dip galvanized after fabrication products must be returned to point of manufacture after coating for inspection and removal of all sharp burrs.
3. Stainless Steel: All strut, fittings and hardware shall be made of AISI Type 304 stainless steel.

2.02 ANCHORS AND FASTENERS

A. Concrete and Structural Elements: Use stainless steel precast insert system, expansion anchors and preset inserts.

B. Steel Structural Elements: Use stainless steel beam clamps.

C. Concrete Surfaces: Use stainless steel self-drilling anchors and expansion anchors.

D. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.

E. Solid Masonry Walls: Use stainless steel expansion anchors and preset inserts.

F. Sheet Metal: Use stainless steel sheet metal screws.

G. Wood: Use stainless steel wood screws.

H. All other fasteners: stainless steel screws, suitable for the required usage.

2.03 HARDWARE

A. Conduit and equipment supports, clamps, and other miscellaneous materials shall be constructed of the following materials as scheduled in Section 26 05 00.
   1. Steel.
   2. Zinc plated steel.
   3. Galvanized, malleable iron.
   4. PVC coated, galvanized, malleable iron.
   5. Stainless steel.
   6. PVC.

PART 3 - CONSTRUCTION METHODS

3.01 FIELD MEASUREMENTS

A. Field verify all measurements. Do not base locations and dimensions on the contract drawings.

B. Identify conflicts with the work of other trades prior to installation of electrical equipment.

C. Adjust equipment support rack installation to satisfy field requirements.

3.02 DELIVERY, STORAGE, AND HANDLING

A. Accept supporting devices on site. Inspect for damage.

B. Protect supporting devices from corrosion and damage. Do not install damaged materials.

3.03 INSTALLATION

A. General:
   1. Furnish and install supports and fasteners for all electrical components required for the project, including free standing supports required for those items remotely mounted from the building structure, catwalks, walkways etc.
   2. Thoroughly clean and remove construction debris from installation.

B. Strut Channel:
   1. Install strut in accordance with MFMA-102 "Guidelines for the Use of Metal Framing"; in accordance with equipment manufacturer's recommendations, and with recognized industry practices.

2. Fabricate supports from channel. Rigidly weld members or use hexagon head bolts to present a neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
3. File and de-bur cut ends of galvanized support channel and spray paint with cold galvanized paint to prevent rusting.
4. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.

C. Anchors and Fasteners:
1. Provide anchors, fasteners, and supports in accordance with NECA "Standard Practices for Good Workmanship in Electrical Contracting".
2. Do not fasten supports to piping, ductwork, mechanical equipment, cable tray or conduit.
3. Do not use spring steel clips and anchors.
4. Do not use powder-actuated anchors.
5. Obtain permission from Engineer before drilling or cutting structural members.
6. Install surface-mounted cabinets and panelboards with minimum of four anchors.
7. Use channel supports to stand cabinets and panelboards 1-5/8-inch off interior or exterior surfaces of exterior walls.
8. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using anchors and fasteners.
9. Install free-standing electrical equipment on 3-inch concrete pads unless indicated otherwise on the drawings.
10. Use threaded rod, minimum size 3/8-inch, for supports where indicated on the drawings.
11. Install products in accordance with manufacturer instructions.

END OF SECTION

SECTION 16195

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.
   1. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
      a. NFPA 70 - National Electrical Code.
      b. ANSI Z535.4 - Product Safety Signs and Labels.
   2. National Electrical Contractors Association (NECA), current edition.
      a. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting.

1.03 DESCRIPTION OF WORK

A. Furnish and install electrical identification systems as indicated on the drawings and as specified herein.

1.04 SUBMITTALS - NOT USED

1.05 FACTORY TESTING - NOT USED

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS- NOT USED

1.07 QUALITY ASSURANCE - NOT USED

1.08 WARRANTY - NOT USED

1.09 EXTRA MATERIALS - NOT USED

PART 2 - PRODUCTS

2.01 NAMEPLATES

A. Engraved three-layer laminated plastic, black letters on white background.

B. Lettering:
   1. 1/4-inch letters for identifying individual equipment and loads.
   2. 1/2-inch letters for identifying grouped equipment and loads.

2.02 CONDUCTOR MARKING

A. The ends of each conductor shall be marked with circuit number, motor number, wire or terminal number.

B. Control system wire marking shall be coordinated with control system and equipment shop drawings.

C. Labels shall be typed in black lettering with indelible ribbons on a white, heat shrink sleeve. Markers shall be shrunk around the wire to ensure a tight, non-slip bond with a compatible heat gun.

D. Heat shrink wire markers shall be Brady Bradysleeve Type B-321 or B-322.

2.03 CONDUCTOR COLOR CODING

A. Conductors No.6 AWG and smaller shall be provided with color coded insulation as described herein. Conductors larger than No.6 AWG may be color coded with appropriately colored Scotch No.35 tape at each end.

B. Color Coding:
1. 277/480 vac system shall be colored brown, orange, yellow, and gray for phases A, B, C, and neutral respectively.
2. 120/208 vac system shall be colored black, red, blue, and white for phases A, B, C, and neutral respectively.
3. 120/240 vac shall be colored black, red, and white for Line 1, Line 2, and neutral respectively.
4. 120 vac control wiring shall be colored red.
5. 24 VDC control wiring shall be colored purple and purple with white stripe for positive and negative conductors respectively.
6. Intrinsically safe control wiring shall be colored light blue.
7. Conductors within control cabinets and motor control centers which are supplied from an external source shall be colored yellow.
8. Grounding conductor and equipment ground conductors shall be colored green.

2.04 CONDUIT MARKING

A. Colored band markers shall be field painted.

B. Color:
1. 480 Volt System: Yellow.
2. 208 Volt and 240 Volt System: White.
3. Fire Alarm System: Red .
4. Low Voltage Communication System: Black.
5. Process Instrumentation and Control System: Blue.

2.05 EQUIPMENT, ENCLOSURE, AND CABINET WARNING SIGNS

A. Electrical Voltage and Shock Hazard Signs
1. Provide OSHA Voltage and Shock Hazard sign for each electrical enclosure, cabinet, or other piece of equipment that presents an electrical hazard under normal operating circumstances or presents an electrical hazard while the enclosure is open.

B. Electrical Arc Flash Hazard Signs
   1. Provide Arc Flash Hazard sign fo each each electrical enclosure, cabinet, or other piece of equipment that presents an arc flash hazard in accordance with NEC and ANSI Z535.4.

C. Electrical Source Signs
   1. Provide sign indicating voltage level and source for each component of the power distribution system and for all control panels.
   2. Provide indicating multiple sources where equipment is fed from multiple sources or where signal wiring is present that is powered from a source external to the equipment

PART 3 - CONSTRUCTION METHODS

3.01 FIELD MEASUREMENTS - NOT USED

3.02 DELIVERY, STORAGE, AND HANDLING - NOT USED

3.03 INSTALLATION

A. Nameplates:
   1. Provide nameplates for grouped equipment such as panelboards, transformers, motor control centers, and control panels. Nameplate shall identify tag number, voltage, ampere rating, and description.
   2. Provide nameplates for individual equipment such as motor control center compartments, field instruments, and field control stations. Nameplate shall identify tag number and description.
   3. Provide nameplates for individual receptacles and switches. Nameplate shall identify panel and circuit number supplying the receptacle and/or switches.
   4. Provide nameplates for control cabinets and motor control center compartments which contain wiring supplied from an external source. Nameplate shall state: Multiple power sources within, verify all power supplies are disconnected before servicing equipment.
   5. Nameplates shall be secured to the front of equipment enclosures with stainless steel screws or rivets. Double sided tape will not be acceptable.
   6. Secure nameplates for flush mounted panelboards behind the panelboard door.

B. Conductor Marking:
   1. Mark conductors at every termination and splice point.
   2. Mark conductors with wire numbers identified by control system supplier, with panel and circuit identification, or with MCC compartment and wire numbers.

C. Conduit Marking:
   1. Furnish colored band markers for each conduit longer than six feet and mark each conduit a minimum of twenty feet on center.
   2. Label each conduit with contained circuit/breaker numbers or function if low voltage or signal.

3.04 TESTING AND START-UP SERVICES - NOT USED

3.05 TRAINING - NOT USED

END OF SECTION

SECTION 16440

ENCLOSED SWITCHES

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.
   1. American National Standards Institute/Instrument Society of America (ANSI/ISA), Specifications and Standards, current edition:
      a. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
         1) NFPA 70 - National Electrical Code.
      b. National Electrical Contractors Association (NECA), Standard of Installation, current edition.
      c. National Electrical Manufacturers Association (NEMA), Specifications and Standards, current edition.
         1) NEMA FU 1 - Low Voltage Cartridge Fuses
         2) NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)
         3) NEMA 250 - Enclosures for Electrical Equipment.
      d. International Electrical Testing Association (NETA)
         1) NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
      e. Underwriters Laboratories, Inc. (UL), Specifications and Standards, current edition.
         1) UL 98 - Enclosed and Dead Front Switches

1.03 DESCRIPTION OF WORK

A. Furnish and install complete and operable enclosed switches as indicated on the drawings and as specified herein.

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300.

B. Submit the following information specifically for enclosed switches:
   1. Manufacturer literature sufficient in scope to demonstrate compliance with the requirements of this specification.
   2. Outline drawings with dimensions.
   3. Equipment ratings for voltage, amperage, horsepower and short circuit.

1.05 QUALITY ASSURANCE

A. All materials, equipment, and parts shall be new and unused of current manufacture.

B. System supplier shall be responsible for providing all necessary accessories required for a complete and operable system.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

D. Products: Listed and classified by UL or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.06 EXTRA MATERIALS

A. Supply three spare fuses of each type supplied for this project

PART 2 - PRODUCTS

2.01 250VAC/600VAC HEAVY DUTY DISCONNECT SWITCH

A. Manufacturers:
1. Square D Company
2. Cutler-Hammer
3. or equal

B. Switch Interior:
1. All switches shall have switch blades which are visible when the switch is off and the cover is open.
2. Lugs shall be front removable and UL Listed for 60 degree C or 75 degree C aluminum or copper conductors as required by the application.
3. Fusible switches shall be equipped with factory installed or field installed fuse pullers.
4. Switches shall be equipped with plated copper current carrying parts to resist corrosion.
5. Switches shall be equipped with removable arc suppressors to facilitate access to line side lugs.
6. Switches shall have provisions for a field installable electrical interlock.

C. Switch Mechanism:
1. Switch operating mechanism shall be quick-make, quick-break such that, during normal operation of the switch, the operation of the contacts shall not be restrained by the operating handle after the closing or opening action of the contacts has started.
2. The operating handle shall be an integral part of the box, not the cover.
3. The handle position shall travel at least 90 degrees between off and on positions to clearly distinguish and indicate handle position.
4. All switches shall have a dual cover interlock mechanism to prevent unintentional opening of the switch cover when the switch is on and prevent turning the switch on when the cover is open. The cover interlock mechanism shall have an externally operated override but the override shall not permanently disable the interlock mechanism. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

D. Switch Enclosures:

1. Environmental Rating:
   a. Service entrance switch, exterior: Type 4X, stainless steel.
   b. Service entrance switch, interior: Type 1.
   c. Disconnect switch, exterior: Type 4X, stainless steel.
   d. Disconnect switch, interior: Type 4X, stainless steel.
   e. Disconnect switch, interior when EMT conduit is allowed: Type 1.
   f. Disconnect switch, hazardous location: Type 7/9.
2. Covers:
   a. Type 1, 4X stainless steel enclosures: attached with welded pin-type hinges.
   b. Type 7/9 enclosures: attached with Type 316 stainless steel bolts.
3. Finish:
   a. Type 1 enclosures: gray baked enamel paint electrodeposited on cleaned, phosphate pre-treated steel.
   b. Type 4X stainless steel enclosures: brush finish on type 304 stainless steel.
   c. Type 7/9 enclosures: gray baked enamel on copper free cast aluminum alloy.
4. The enclosure shall have on and off markings stamped or cast into the cover.
5. The operating handle shall be provided with a dual colored, red/black position indication.
6. All switches shall have provisions to accept up to three 3/8-inch hasp padlocks to lock the operating handle in the off position.
7. Exterior switches shall have provisions to accept one 3/8-inch hasp padlocks to lock the operating handle in the on position.
8. Conduit Entrance:
   a. Tangential knockouts shall be provided for Type 1 switches rated 30-200A.
   b. Watertight conduit hubs for Type 4X stainless steel switches.
   c. Threaded conduit openings in both end walls for Type 7/9 enclosures.
9. Cover sealing means for switches rated through 200 amperes shall be quick release trunk latches (Type 1, 4X stainless steel enclosures) and type 316 stainless steel bolts (Type 7/9 enclosures).
10. Type 7/9 enclosures shall be furnished with a breather and drain kit to allow their use in outdoor applications.
11. Type 4X stainless steel enclosures shall be dual rated as Type 3R to facilitate their use in outdoor applications.

E. Switch Ratings:
1. Switch shall be suitable for use as service entrance equipment where use is indicated on the drawings.
2. Switches shall be horsepower rated for ac and/or dc as indicated on the plans.
3. Switches shall be rated for the voltage applied.
4. The UL Listed short circuit current rating of the switches shall be:
   a. 10,000 rms symmetrical amperes when used with or protected by Class H or K fuses (30-600 ampere).
   b. 200,000 rms symmetrical amperes when used with or protected by Class R or Class J fuses (30-600 ampere switches employing appropriate fuse rejection schemes).
   c. 200,000 rms symmetrical amperes when used with or protected by Class L fuses (800-1200 ampere).

2.02 FUSES

A. Manufacturers:
   1. Bussmann
   2. or equal

B. 250 Volt Fuses:
   1. Class RK-1, one end rejection or to fit mountings specified. 0-600 ampere, 200,000 ampere interrupting rating.
   2. Low-Peak LPN-R, dual element, time delay with short circuit protection for motor, transformer, feeder and main service protection.

C. 600 Volt Fuses:
   1. Class RK-1, one-end rejection or to fit mountings specified, 0-600 ampere, 200,000 ampere interrupting rating.
   2. Low-Peak LPS-R, dual element, time delay with short circuit protection. 0-600 ampere, 200,000 ampere interrupting rating for motor, transformer, feeder and main service protection.
   3. Class L, bolt-in, 601-6,000 amperes, 200,000 ampere interrupting rating.
   4. HI-CAP KRP-C, time delay for overload and short circuit protection. 601-6,000 amperes, 200,000 ampere interrupting rating for motor, transformer, feeder and main service protection.
   5. Class CC, fast acting, single element, 0-30 amperes, 200,000 ampere interrupting rating.

PART 3 - CONSTRUCTION METHODS

3.01 FIELD MEASUREMENTS

A. Field verify all measurements. Do not base exact enclosed switch locations on the contract drawings.

B. Identify conflicts with the work of other trades prior to installation of electrical equipment.

C. Adjust enclosed switch installation to satisfy field requirements.

3.02 DELIVERY, STORAGE, AND HANDLING

A. Accept enclosed switches on site. Inspect for damage.

B. Protect enclosed switches from corrosion and entrance of debris.

C. Store enclosed switches above grade. Protect from environment with suitable covering.

3.03 INSTALLATION

A. Install fuses where switches are indicated as fusible switches on the drawings.

B. Install enclosed switches plumb and level.

C. Install enclosed switches such that top of enclosure is located at an elevation of 6-feet above finished floor elevation.

D. Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections.

E. Verify that bonding jumper is properly installed in service entrance rated switches.

F. Thoroughly clean and remove construction debris from switch interior and exterior.

END OF SECTION

SECTION 16460

LOW-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.
   1. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
      a. NFPA70 - National Electrical Code.
   2. National Electrical Contractors Association (NECA), current edition.
      a. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting.
   3. National Electrical Manufacturers Association (NEMA), Specifications and Standards, current edition.
      a. NEMA ST 1 - Specialty Transformers
      b. NEMA ST20 - Dry Type Transformers for General Applications.
      c. NEMA TP1 - Guide for Determining Energy Efficiency for Distribution Transformers.
      d. NEMA TP2 - Standard Test Method for Measuring the Energy Consumption of Distribution Transformers.
   4. International Electrical Testing Association (NETA)
      a. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
   5. Underwriters Laboratories, Inc. (UL), Specifications and Standards, current edition.
      a. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers.

1.03 DESCRIPTION OF WORK

A. Furnish and install complete and operable lighting and distribution transformers as indicated on the drawings and as specified herein.

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300.

B. Submit the following information specifically for low voltage transformers:
   1. Literature sufficient in scope to demonstrate compliance with the requirements of this specification.
   2. Performance data and physical dimensions including outline and support point dimensions of enclosures and accessories, unit weight, voltage, kVA, and impedance ratings and characteristics, loss data, efficiency at 25, 50, 75 and 100 percent rated load, sound level, tap configurations, insulation system type, and rated temperature rise.

1.05 FACTORY TESTING - NOT USED

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS - NOT USED

1.07 QUALITY ASSURANCE

A. All materials, equipment, and parts shall be new and unused of current manufacture.

B. System supplier shall be responsible for providing all necessary accessories required for a complete and operable system.

C. Manufacturer Qualifications: All transformers provided under this section shall be the products of a single company specializing in manufacturing products specified in this section, with not less than fifty years of documented experience.

D. Products: Listed and classified by UL or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

E. Panelboard manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

PART 2 - PRODUCTS

2.01 ENERGY EFFICIENT, DRY-TYPE TRANSFORMERS

A. Manufacturer:
   1. Square D.
   2. Cutler-Hammer.
   3. or equal.

B. Ratings:
   1. Insulating materials shall exceed NEMA ST20 standards and be rated for 220 degree C, UL component recognized insulation system.
   2. Transformers rated 15kVA and larger shall be 150 degree C temperature rise above 40 degree C ambient.
   3. Transformers rated 25kVA and larger shall have a minimum of 4 - 2.5 percent full capacity primary taps.
   4. The maximum temperature of the top of the enclosure shall not exceed 50 degree C rise above a 40 degree C ambient.
   5. Transformer voltage and kVA ratings shall be as indicated on the drawings.

C. Efficiency:
   1. Transformers shall be low loss type with minimum efficiencies per NEMA TP1 and Department of Energy "Energy Star" Program when operated at 35 percent of full load capacity. Efficiency shall be tested in accord with NEMA TP2.
   2. Minimum transformer efficiency shall comply with the following table:

TRANSFORMER MINIMUM EFFICIENCY			
SINGLE PHASE		THREE PHASE	
KVA	PERCENT EFFICIENCY	KVA	PERCENT EFFICIENCY
15	97.7	15	97.0
25	98.0	30	97.5
37.5	98.2	45	97.7
50	98.3	75	98.0
75	98.5	112.5	98.2
100	98.6	150	98.3
167	98.7	225	98.5
250	98.8	300	98.6
333	98.9	500	98.7
		750	98.8

D. Construction:

1. Transformer coils shall be of the continuous wound construction and shall be impregnated with nonhygroscopic, thermosetting varnish.
2. All cores shall be constructed with low hysteresis and eddy current losses. Magnetic flux densities are to be kept well below the saturation point to prevent core overheating. Cores for transformers greater than 500kVA shall be clamped utilizing insulated bolts through the core laminations to ensure proper pressure throughout the length of the core. The completed core and coil shall be bolted to the base of the enclosure but isolated by means of rubber vibration-absorbing mounts. There shall be no metal-to-metal contact between the core and coil and the enclosure except for a flexible safety ground strap. Sound isolation systems requiring the complete removal of all fastening devices will not be acceptable.
3. The core of the transformer shall be visibly grounded to the enclosure by means of a flexible grounding conductor sized in accordance with applicable UL and NEC standards.
4. The transformer enclosures shall be ventilated and be fabricated of heavy gauge, sheet steel construction. The entire enclosure shall be finished utilizing a continuous process consisting of degreasing, cleaning and phosphatizing, followed by electrostatic deposition of polymer polyester powder coating and baking cycle to provide uniform coating of all edges and surfaces. The coating shall be UL recognized for outdoor use. The coating color shall be ANSI 49.

E. Sound Levels:

1. Sound levels shall not to exceed the following:
   a. 15 to 50KVA - 45dB
   b. 51 to 150kVA - 50dB

c. 151 to 300kVA - 55dB
d. 301 to 500kVA - 60dB
e. 501 to 700kVA - 62dB
f. 701 to 1000kVA - 64dB
g. 1001 to 1500kVA - 65dB
h. 1501 to 2000kVA- 66dB

F. Accessories
1. Provide the following accessories where indicated on the drawings:
a. Weathershields
b. Wall mounting brackets.
c. Ceiling mounting brackets.

PART 3 - CONSTRUCTION METHODS

3.01 FIELD MEASUREMENTS

A. Field verify all measurements. Do not base exact transformer locations on the contract drawings.

B. Identify conflicts with the work of other trades prior to installation of electrical equipment.

C. Adjust transformer installation to satisfy field requirements.

3.02 DELIVERY, STORAGE, AND HANDLING

A. Accept transformers on site. Inspect for damage.

B. Protect transformers from corrosion and entrance of debris.

C. Store transformers above grade. Protect from environment with suitable covering.

D. Handle transformers using only lifting eyes and brackets provided for that purpose.

3.03 INSTALLATION

A. General:
1. Install transformers in accordance with NECA "Standard of Installation.", all requirements of the NEC, and manufacturer recommended practices.

B. Separately Mounted Transformer Installation:
1. Set transformer plumb and level.
2. Use flexible conduit, 2-foot minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.
3. Mount transformers on vibration isolating pads suitable for isolating the transformer noise from the building structure.
4. Provide sufficient space around transformer for cooling as recommended by the manufacturer.

C. Structural Coordination:
1. Provide structural supports suitable for the transformer weight for wall and ceiling mounted units.

3.04 TESTING AND START-UP SERVICES

A. Check for damage and tight connections prior to energizing transformer.

B. Measure primary and secondary voltages and make appropriate tap adjustments within 2-1/2 percent of the nominal operating voltage after the building is in full operation.

3.05 TRAINING - NOT USED

END OF SECTION

SECTION 16470

PANELBOARDS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.

1. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
   a. NFPA 70 - National Electrical Code.
2. National Electrical Contractors Association (NECA), current edition.
   a. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting.
3. National Electrical Manufacturers Association (NEMA), Specifications and Standards, current edition.
   a. NEMA PB 1 - Panelboards
   b. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
   c. NEMA AB 1 - Molded Case Circuit Breakers.
   d. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)
   e. NEMA 250 - Enclosures for Electrical Equipment.
4. International Electrical Testing Association (NETA)
   a. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
5. Underwriters Laboratories, Inc. (UL), Specifications and Standards, current edition:
   a. UL 50 - Enclosures for Electrical Equipment
   b. UL 67 - Panelboards.
   c. UL 98 - Enclosed and Dead-front Switches
   d. UL 489 - Molded-Case Circuit Breakers and Circuit Breaker Enclosures
6. Canadian Standards Association (CSA), Specifications and Standards, current edition:
   a. CSA Standard C22.2 No. 29-M1989 - Panelboards and Enclosed Panelboards
   b. CSA Standard C22.2 No. 5-M91 - Molded Case Circuit Breakers
7. Federal Specifications and standards, current edition:
   a. W-P-115C - Type I Class 1
   b. W-C-375B - Molded Case Circuit Breakers
   c. W-C-375B/Gen - Circuit Breakers, Molded Case, Branch Circuit and Service.
   d. W-P115C - Type 1 Class 2 Load Center

1.03 DESCRIPTION OF WORK

A. Furnish and install complete and operable panelboards as indicated on the drawings and as specified herein.

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300.

B. Submit the following information specifically for panelboards:
   1. Literature sufficient in scope to demonstrate compliance with the requirements of this specification.
   2. Overall panelboard dimensions, interior mounting dimensions, and wiring gutter dimensions. The location of the main, branches, and solid neutral shall be clearly shown. Illustrate one line diagrams with applicable voltage systems.
   3. Equipment ratings for voltage, amperage, and short circuit.

1.05 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS

A. Submit operation & maintenance manuals and instructions in accordance with Section 01300.

B. Submit the following information specifically for panelboards:
   1. Manufacturer shall provide installation instructions and NEMA Standards Publication PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

1.06 QUALITY ASSURANCE

A. All materials, equipment, and parts shall be new and unused of current manufacture.

B. System supplier shall be responsible for providing all necessary accessories required for a complete and operable system.

C. Manufacturer Qualifications: All panelboards provided under this section shall be the products of a single company specializing in manufacturing products specified in this section, with not less than fifty years of documented experience.

D. Products: Listed and classified by UL or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

E. Panelboard manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

PART 2 - PRODUCTS

2.01 240VAC LIGHTING AND APPLIANCE BRANCH CIRCUIT LOAD CENTERS

A. Manufacturers:
   1. Square D Company QO Load Center
   2. Cutler-Hammer Type CH
   3. or equal

B. Interiors:

1. Bus bar connections to the branch circuit breakers shall be the distributed phase type and shall accept plug-on circuit breakers. 300-400A load centers shall accept a 150A maximum bolt-on breaker in addition to plug-on types.
2. Short Circuit Current Ratings: shall be provided as indicated on the drawings. This rating shall be established by manufacturer testing of a representative load center with branch circuit breakers installed.

C. Circuit Breakers:
1. Circuit breakers shall be plug-on thermal magnetic trip, with an integral crossbar to ensure simultaneous opening of all poles in multi-pole circuit breakers.
2. Circuit breakers shall have an overcenter, tripfree, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication.
3. Handles shall have ON, OFF, and "Tripped" positions. In addition, trip indication shall include an indicator appearing in the window of the circuit breaker case (through 125 amperes).
4. Circuit breakers shall be UL Listed in accordance with UL standard 489 with current ratings as indicated on the plans. Interrupting ratings shall be selected to provide the required load center short circuit current rating.
5. Single-pole, 15 and 20 ampere circuit breakers indicated on the drawings as intended to switch fluorescent lighting loads on a regular basis shall have the SWD marking.
6. Two- and three-pole circuit breakers 15-60 amperes indicated on the drawings as intended for use with air conditioning, heating, and refrigeration equipment having motor group combinations and marked as such shall have the HACR marking.
7. Provide UL Class A ground fault interrupter circuit breakers where indicated on drawings.
8. The following special application circuit breakers or circuit breaker accessories shall be provided where indicated on the drawings:
    a. Circuit breakers with remote control switching capability
    b. Circuit breakers for use on high intensity discharge lighting systems
    c. Key operated circuit breakers
    d. Switch neutral circuit breakers
    e. Shunt trip, auxiliary switch, or alarm switch accessories

D. Enclosures:
1. NEMA PB1: Type 1 or Type 3R as indicated on the drawings.
2. Enclosure shall be fabricated of cold rolled steel for NEMA 1 and galvannealed steel or equivalent rust-resistant steel for NEMA 3R.
3. Indoor Type 1 enclosures shall have a flush or surface front as indicated on the drawings and flush cylinder tumble-type lock, all keyed alike, with finish to be gray baked enamel.
4. Outdoor Type 3R enclosures shall have a hasp to secure the cover. Finish to be gray baked enamel.
5. A directory label shall be provided with circuits identified as indicated on the schedule.

2.02 MOLDED CASE CIRCUIT BREAKERS

A. General
1. Circuit breakers shall be constructed using glass reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.

2. Circuit breakers shall have an over center, trip free, toggle operating mechanism which will provide quick-make, quick-break contact action. The circuit breaker shall have common tripping of all poles.
3. The circuit breaker handle shall reside in a tripped position between ON and OFF to provide local trip indication. Circuit breaker escutcheon shall be clearly marked ON and OFF in addition to providing International I/O markings.
4. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker.
5. Each circuit breaker shall be equipped with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit breaker tripping mechanism for maintenance and testing purposes.
6. Circuit breakers shall be factory sealed with a hologram quality mark and shall have date code on face of circuit breaker.
7. Circuit breaker/circuit breaker combinations for series connected interrupting ratings shall be listed by UL as recognized component combinations. Any series rated combination used shall be marked on the end use equipment along with the statement "Caution - Series Rated System. _____ A Available. Identical Replacement Component Required".
8. Manufacturer shall provide electronic and hard copy time/current characteristic trip curves (and Ip & I^2t let through curves for current limiting circuit breakers) for each type of circuit breaker.
9. The circuit breakers shall be UL Listed for use with and provided with the following accessories where indicated on the drawings: Shunt Trip, Under Voltage Trip, Ground Fault Shunt Trip, Auxiliary Switch, Alarm Switch, Mechanical Lug Kits, and Compression Lug Kits. Circuit breaker handle accessories shall provide provisions for locking handle in the ON and OFF position for all circuits that supply exit signs, emergency lights, energy management, control system panels, and fire alarm panels.
10. All circuit breakers shall be UL Listed for reverse connection without restrictive line and load markings and be suitable for mounting in any position.
11. Circuit breakers shall be fixed construction with factory installed mechanical lugs. All circuit breakers shall be UL Listed to accept field installable/removable lugs. Lug body shall be bolted in place; snap in design not acceptable. All lugs shall be UL Listed to accept solid (not larger than #8 AWG) and/or stranded copper and aluminum conductors. Lugs shall be suitable for 90 degree C rated wire, sized according to the 75 degree C temperature rating in the National Electrical Code.
12. All circuit breakers shall be capable of accepting bus connections.

B. Thermal-Magnetic Circuit Breakers
1. Circuit breakers shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole.
2. Thermal trip elements shall be factory preset and sealed. Circuit breakers shall be true rms sensing and thermally responsive to protect circuit conductor(s) in a 40 degree C ambient temperature.
3. Circuit breaker frame sizes above 100 amperes shall have a single magnetic trip adjustment located on the front of the circuit breaker.
4. Standard two- and three-pole circuit breakers up to 250 amperes at 600 VAC shall be UL Listed as HACR type.

PART 3 - CONSTRUCTION METHODS

3.01 FIELD MEASUREMENTS

A. Field verify all measurements. Do not base exact panelboard locations on the contract drawings.

B. Identify conflicts with the work of other trades prior to installation of electrical equipment.

C. Adjust panelboard installation to satisfy field requirements.

3.02 DELIVERY, STORAGE, AND HANDLING

A. Accept panelboard on site. Inspect for damage.

B. Protect panelboard from corrosion and entrance of debris.

C. Store panelboard above grade. Protect from environment with suitable covering.

3.03 INSTALLATION

A. Install panelboards plumb and flush with wall finishes.

B. Install panelboards such that top of panel is located at an elevation of 6-feet above finished floor elevation.

C. Provide filler plates for unused spaces in panelboards.

D. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

E. Stub five empty 1-inch conduits to accessible location above ceiling or below floor of each flush-mounted panelboard to allow for future expansion.

F. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 10 percent, rearrange circuits in the panelboard to balance the phase loads within 10 percent. Take care to maintain proper phasing for multi wire branch circuits.

G. Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

H. Verify that bonding jumper is properly installed in service entrance rated panels.

I. IThoroughly clean and remove construction debris from panelboard interior and exterior.

END OF SECTION

SECTION 16480

MOTOR CONTROL CENTERS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.
   1. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
      a. NFPA 70 - National Electrical Code.
   2. Canadian Standards Associates (CSA), Specifications and Standards, Current Edition.
   3. Electrical and Electronic Manufacturers Association Canada (EEMAC), Specifications and Standards, Current Edition.
   4. International Electrotechnical Association (IEC), Specifications and Standards, Current Edition:
      a. IEC-60439 - Low Voltage Switchgear and Control Gear Assemblies.
   5. National Electrical Contractors Association (NECA), current edition.
      a. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting.
   6. National Electrical Manufacturers Association (NEMA), Specifications and Standards, Current Edition:
      a. ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays Rated 600 Volts.
      b. ICS 2.3-1995 (R2002) - Industrial Control and Systems: Instructions for the Handling, Installation, Operation, and Maintenance of Motor Control Centers Rated Not More than 600 Volts.
      c. ICS 4-2000 - Industrial Control and Systems: Terminal Blocks.
      d. ICS 5-2000 - Industrial Control and Systems: Control Circuit and Pilot Devices.
   7. Underwriters Laboratories, Inc. (UL), Specifications and Standards, Current Edition:
      a. UL 845 - Standard for Motor Control Centers

1.03 DESCRIPTION OF WORK

A. For the purpose of obtaining a complete and integrated process instrumentation and control system, the work specified herein shall be included under the scope of:
   1. Section 16900 - Process Instrumentation & Control

B. Furnish and install complete and operable motor control centers as indicated on the drawings and as specified herein.

C. Motor control equipment specified under this section shall be the product of a single manufacture unless stated otherwise.

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300.

B. Submit shop drawings for the equipment specified herein as part of the complete, integrated submittal for the process instrumentation & control system and in accordance with the requirements specified under Section 16900 - Process Instrumentation & Control.

C. Submit the following information specifically for motor control centers:
   1. Literature sufficient in scope to demonstrate compliance with the requirements of this specification.
   2. Equipment ratings for voltage, amperage, and short circuit.
   3. Dimension drawings.
   4. Conduit entrance drawings:
      a. Maximum conduit and cable size.
      b. Locations.
   5. Unit wiring diagrams:
      a. Individual diagram for each unit.
      b. Show tag numbers and descriptions.
      c. Show wire and terminal numbers.
   6. Unit layout diagrams:
      a. Individual diagram for each unit.
      b. Show tag numbers and descriptions.
   7. Control Logic Diagrams:
      a. Individual diagram for each unit.
      b. Show tag numbers and descriptions.
      c. Show wire and terminal numbers.
      d. Show field device interconnections.
      e. Custom drawings are required to fulfill this requirement. Manufacturer's standard diagrams are not acceptable.
   8. Bus size and ratings.
   9. Protective device frame sizes and trip ratings.
   10. Nameplate legend.
   11. Symbol and abbreviation list.
   12. Manufacturer's installation instructions
      a. Indicate application conditions and limitations of use.
      b. Indicate instructions for storage, handling, protection, examination, preparation, installation, starting, and testing of equipment.

1.05 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS

A. Submit operation & maintenance manuals and instructions in accordance with Section 01300.

B. Submit operation and maintenance manuals for the equipment specified herein as part of the complete, integrated manual for the process instrumentation and control system and in accordance with the requirements specified under 16900 - Process Instrumentation & Control.

C. Submit the following information specifically for motor control centers:
   1. As-built wiring and layout diagrams.
   2. Manufacturer maintenance instructions.
   3. Motor controller data listing identifying all adjustable settings and configurable

1.06 QUALITY ASSURANCE

A. All materials, equipment, and parts shall be new and unused of current manufacture.

B. System supplier shall be responsible for providing all necessary accessories required for a complete and operable system.

C. Manufacturer Qualifications: All motor control centers provided under this section shall be the products of a single company specializing in manufacturing products specified in this section, with not less than twenty years of documented experience.

D. Products: Listed and classified by UL or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

E. Motor Control Center manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Eaton/Cutler-Hammer.

2.02 MOTOR CONTROL CENTER STRUCTURE

A. Enclosure:
   1. NEMA Type 1 with closed cell neoprene gaskets.
   2. 90-inch high by 20-inch deep structure consisting of one or more vertical sections of varying widths bolted together.

B. Vertical Sections:
   1. Construction:
      a. Rigid, freestanding structure.
      b. Heavy-duty internal base mounting angles at bottom of structure, continuous within shipping block.
      c. Removable heavy duty lifting angle, continuous within shipping block. Lifting eyelets are not acceptable.
      d. Rounded-edge tightly fitted metal work with no visible air gaps.
      e. Full metal side sheets for isolation and minimization of fault propagation between adjacent vertical sections.
      f. Removable end plates:
         1) Horizontal power bus.
         2) Horizontal wire way.
         3) End of structure vertical sections only.
         4) Removable one-piece top plate.
         5) Bottom plate.
   2. Wire ways:
      a. Horizontal:

1) Top and bottom extending full depth of structure.
2) Ninety square inches of unobstructed wiring space at top and bottom of each vertical section.
3) Six inches high, extending entire length of structure with twenty-five square inch opening between vertical sections.
4) Isolated from horizontal and vertical bus.
5) Removable front covers held in place with captive screws.
6) Seven inch deep horizontal wire way in incoming line section, isolated from incoming line compartment.

b. Vertical:
1) Full height 4.37-inch wide by 7-inch deep in each vertical section.
2) Isolated from horizontal and vertical bus.
3) Integral to vertical section, independent from plug-in units.
4) Removable hinged cover with quarter-turn latches.
5) Vertical wire way tie bars for securing wiring in place.

3. Structure Coatings:
a. Structural metal parts cleaned, rinsed, and painted to uniform thickness.
b. Coatings:
1) Paint all surfaces ANSI 49 medium light gray except as noted.
2) Paint vertical wire ways and unit back plates gloss white.
3) Do not paint stainless steel parts.
4) Plate unpainted parts for corrosion resistance.

C. Bus bars:
1. Horizontal Power Bus:
a. The horizontal bus shall be rated as shown on the drawings.
b. The horizontal bus material shall be copper with tin plating.
c. The horizontal bus shall be supported, braced and isolated from the vertical bus with a high strength, non-tracking glass polyester material.
d. For standard sections the horizontal bus shall be continuous within each shipping block and shall be braced within each section
e. Horizontal bus splices shall have at least 2 bolts on each side.

2. Vertical Bus:
a. The vertical power bus shall have an effective rating of 600A. If a center horizontal bus construction is utilized, then the rating shall be 300A above and below the horizontal bus for an effective rating of 600A. If a top or bottom mounted horizontal bus is utilized, then the full bus must be rated for 600A.
b. The vertical bus material shall be copper with tin plating.
c. The vertical bus shall attach to the horizontal bus with at least 2 bolts.
d. The vertical bus shall be continuously braced by a high strength non-tracking glass-filled polyester material and sandwiched by a glass-filled polycarbonate molded cover.
e. Automatic shutters shall cover plug-in stab openings when units are removed.

3. Ground Bus:
a. Provide a ground bus system consisting of a horizontal ground bus connected to vertical ground buses mounted in each section.
b. Provide an unplated copper (0.25 inch by 2 inch) horizontal ground bus mounted in the bottom of the MCC unless otherwise specified in the drawings.

c. Provide a pressure type mechanical lug mounted on the ground bus in the incoming line section.

d. Provide a unit ground stab on all unit inserts. The ground stab shall establish unit insert grounding to the vertical ground bus before the plug-in power stabs engage the power bus. The grounding shall be maintained until after the plug-in power stabs are disengaged.

4. Neutral Bus

a. If a 4-wire system is specified, yet there are no neutral loads in the MCC, only a neutral connection plate is required in the MCC; i.e. a full neutral bus is not required.

b. If neutral loads are specified within the MCC, a full neutral bus is required. Provide a neutral bus across the full width of the MCC, an incoming neutral lug pad in the incoming section, and neutral connection plates in sections as required.

D. Isolation and Insulation:

1. Shutters shall automatically open when a unit is inserted and automatically close when a unit is removed, so that personnel are not exposed to live vertical bus bars and so that the bus is isolated from arcing faults.

2.03 PLUG-IN UNITS

A. General

1. Plug-in units shall consist of unit assembly, unit support pan and unit door assembly.
2. Units shall be supplied with removable doors. The unit doors shall be fastened to the structure so that the doors can be closed when the unit is removed.
3. A unit support pan shall be provided for support and guiding units. Unit support pans shall remain in the structure when units are removed to provide isolation between units.
4. A service position shall be provided for plug-in units that allows for the unit to be supported, but disengaged from the bus. The unit shall be capable of being padlocked in the service position.

B. Power Stabs

1. Unit stabs for engaging the power bus shall be tin plated copper and provided with stainless back-up springs to provide and maintain a high pressure 4-point connection to the vertical bus.
2. Wiring from the unit disconnecting means to the plug-in stabs shall not be exposed to the rear of the unit. A separate isolated pathway shall be provided for each phase to minimize the possibility of unit fault conditions reaching the power bus system.
3. The power cable termination at the plug-in stab shall be a maintenance-free crimp type.

C. Unit Mounting:

1. After insertion, each plug-in unit shall be held in place by a latch that is located at the front of the unit. Multi-turn latches requiring more than ten turns per latch shall not be acceptable.
2. Mount plug-in stabs in polyester molding at the rear of the unit. Rout wiring from the unit disconnecting means to the plug-in stabs into this molding such that the wiring is not exposed at the rear of the unit.

3. Fasten the unit door to the stationary structure (not the unit itself), so that the door can close with the unit removed. Hinge the door on the left-hand side so that it opens away from the vertical wire way.

D. Disconnecting Means:
1. Units shall be provided with a heavy-duty, industrial, flange mounted handle mechanism for control of each disconnect switch or circuit breaker.
2. The operator units may pivot in the vertical or horizontal plane.
3. The on-off condition shall be indicated by the handle position, red and green color indicators with the words ON and OFF, and the international symbols I and O along with a pictorial indication of the handle position.
4. Handles shall be capable of being locked in the OFF position with up to three padlocks.
5. The operator handle shall be interlocked with the unit door so that the disconnect cannot be switched to the ON position unless the unit door is closed. A means shall be provided for purposely defeating the interlock during maintenance or testing.
6. The operator handle shall be interlocked with the unit so that the unit cannot be inserted or withdrawn with the operator handle in the ON position.

2.04 MOTOR CONTROLLER UNITS

A. Unit Control Power:
1. Mount control circuit transformer within the unit and provide primary fuses.
2. Provide excess capacity in addition to that required by the starter coil to accommodate loads shown on the drawings.

B. Motor Controllers:
1. Provide combination motor controllers, UL listed as a complete assembly including disconnecting means, contactor, and overload protection as specified in Section 26 29 13.
2. Provide combination adjustable frequency motor controllers as specified in Section 26 29 23.

2.05 INCOMING LINE UNITS

A. Main circuit breaker:
1. Ampere rating as shown on drawings.
2. Inverse time thermal magnetic, electronic trip where indicated.
3. Mounting: front accessible with removable protective barrier.
4. Service entrance rated where required.

B. Metering compartment (where shown on drawings):
1. Digital power monitor capable of monitoring frequency, current, voltage, power factor, real power, reactive power, apparent power, average current, and peak current, average and peak demand, accumulated energy.
2. Communication port as shown on drawings.
3. Mount in separate unit compartment.

C. Surge protective device (where shown on drawings):
1. Surge suppression system rated to provide minimum of 160 KA per phase surge current protection.

2. Provide complete with fused disconnect, control circuiting to monitor status of all protection modes, and green status indicators.
3. Mount in separate unit compartment.

2.06 FEEDER UNITS

A. Unit Mounting:
1. After insertion, each plug-in unit shall be held in place by a latch that is located at the front of the unit. Multi-turn latches requiring more than ten turns per latch shall not be acceptable.
2. Mount plug-in stabs in polyester molding at the rear of the unit. Rout wiring from the unit disconnecting means to the plug-in stabs into this molding such that the wiring is not exposed at the rear of the unit.
3. Fasten the unit door to the stationary structure (not the unit itself), so that the door can close with the unit removed. Hinge the door on the left-hand side so that it opens away from the vertical wire way.

B. Disconnecting Means:
1. The operator handle of all units shall be interlocked with the MCC frame, so that a unit insert can not be withdrawn or inserted when the operator is in the ON position.
2. Feeder breakers shall be molded case circuit breakers with thermal magnetic trip of the ampacity indicated on the drawings and have a short circuit rating greater than the available fault current indicated on the drawings.

2.07 LIGHTING PANEL AND TRANSFORMER UNITS

A. Disconnecting Means:
1. The operator handle of all units shall be interlocked with the MCC frame, so that a unit insert can not be withdrawn or inserted when the operator is in the ON position.
2. Lighting transformer main breakers shall be molded case circuit breakers with thermal magnetic trip of the ampacity indicated on the drawings and have a short circuit rating greater than the available fault current indicated on the drawings.

B. Lighting Transformer:
1. Lighting transformers shall conform to the requirements of Section 26 22 00 and shall be suitable for frame mounting in MCC structure.

C. Lighting Panel:
1. Lighting panel shall conform to the requirements of Section 26 24 16 and shall be suitable for frame mounting in MCC structure.

2.08 MISCELLANEOUS REQUIREMENTS

A. Control Terminal Blocks:
1. Mounting: front interior of unit in accessible location.
2. Type: as specified in Section 26 90 11.
3. Machine printed labels.
4. Wire size: #14 AWG.

B. Power Terminal Blocks:

1. NEMA Size 1 and 2 units: pull-apart blocks, #4 AWG maximum wire size.
2. NEMA size 3 units: Fixed blocks, #1/0 AWG maximum wire size.
3. NEMA size 4 and larger units: None.

C. Control Devices:
1. As specified in Section 26 90 11 and shown on drawings.
2. Mounting: door mounted removable control station.
3. Overload reset: external low profile button.
4. Auxiliary contacts: as shown, minimum of two normally open and two normally closed.

D. Nameplates
1. A master nameplate shall be provided on each MCC lineup.
2. Unit Nameplates:
   a. Indicate unit identifier and description.
   b. 3-5/8 inch by 1-1/8 inch engraved label in accordance with Section 16195.
3. Unit identification label:
   a. Indicate catalog number/serial number of unit inside unit.

E. Motor Data Label:
1. Machine printed adhesive label.
2. Indicate:
   a. Motor served.
   b. Motor nameplate horsepower.
   c. Motor nameplate full load amperes.
   d. Motor code letter.
   e. e. Motor design letter.
   f. Motor service factor.
   g. Voltage and phase rating.
   h. Disconnecting means trip setting.
   i. Overload relay settings.

PART 3 - CONSTRUCTION METHODS

3.01 FIELD MEASUREMENTS

A. Field verify all measurements. Do not base exact motor control center locations locations on the contract drawings.

B. Identify conflicts with the work of other trades prior to installation of electrical equipment.

C. Identify deviation from physical sizes shown on the drawings to Engineer prior to bid date.

D. Contractor shall be responsible for modifications to the installation due to deviations from physical sizes shown on the drawings.

E. Identify conflicts with the work of other trades prior to installation of electrical equipment.

F. Record nameplate data for each motor served.

G. Adjust motor control center installation to satisfy field requirements.

3.02 DELIVERY, STORAGE, AND HANDLING

A. Accept motor control centers on site. Inspect for damage.

B. The Contractor shall be responsible for all equipment necessary to receive, unload, move into building, and install motor control centers.

C. he Contractor shall be responsible for coordinating specific shipping split requirements with the manufacturer/supplier.

D. Conform to written instructions of manufacturer.

E. Protect motor control centers from corrosion and entrance of debris.

F. Store motor control centers above grade. Protect from environment with suitable covering.

3.03 INSTALLATION

A. Adjust disconnecting means trip settings to satisfy motor nameplate requirements.

B. Provide overload relays sized and adjusted for the actual nameplate data recorded for each motor. No additional compensation will be allowed due to failure to select overload devices based upon actual motor nameplate data.

C. Record information for motor data labels and install motor data labels.

D. Install interconnecting wiring between vertical sections of MCC. No additional compensation will be allowed due to failure to coordinate wiring requirements with the manufacturer/supplier.

E. Install motor control centers plumb and flush with wall finishes.

F. Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of all connections.

G. Verify that bonding jumper is properly installed in service entrance rated motor control centers.

H. Thoroughly clean and remove construction debris from panelboard interior and exterior.

3.04 TESTING AND START-UP SERVICES

A. Refer to the requirements of Section 26 90 00 - Process Instrumentation & Control.

3.05 TRAINING

A. Refer to the requirements of Section 26 90 00 - Process Instrumentation & Control.

END OF SECTION

SECTION 16481

ADJUSTABLE FREQUENCY MOTOR CONTROLLERS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.
   1. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
      a. NFPA 70 - National Electrical Code.
   2. Canadian Standards Associates (CSA), Specifications and Standards, Current Edition.
   3. European Committee for Electrotechnical Standardization (CENELEC), Current Edition.
      a. EN 60947 - Low-Voltage Switchgear and Controlgear - Part 4-2: Contactors and Motor-Starters - AC Semiconductor Motor Controllers and Starters
   4. Electrical and Electronic Manufacturers Association Canada (EEMAC), Specifications and Standards, Current Edition.
   5. Institute of Electrical and Electronics Engineers (IEEE), current edition.
      a. IEEE 519-1992 - Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems
   6. International Electrotechnical Association (IEC), Specifications and Standards, Current Edition:
      a. IEC-60439 - Low Voltage Switchgear and Control Gear Assemblies.
   7. National Electrical Contractors Association (NECA), current edition.
      a. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting.
   8. National Electrical Manufacturers Association (NEMA), Specifications and Standards, Current Edition:
      a. ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays Rated 600 Volts.
      b. ICS 3.1 - Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems.
      c. ICS 4-2000 - Industrial Control and Systems: Terminal Blocks.
      d. ICS 5-2000 - Industrial Control and Systems: Control Circuit and Pilot Devices.
      e. ICS 6-1993 - Industrial Control and Systems Enclosures
      f. ICS 7-1993 - Industrial Control and Systems Adjustable-Speed Drives
      g. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum)
   9. Underwriters Laboratories, Inc. (UL), Specifications and Standards, Current Edition:
      a. UL 508C - Power Conversion Equipment.

1.03 DESCRIPTION OF WORK

A. For the purpose of obtaining a complete and integrated process instrumentation and control system, the work specified herein shall be included under the scope of:
   1. Section 16480 - Motor Control Centers

2. Section 16900 - Process Instrumentation & Control

B. Furnish and install complete and operable adjustable frequency drive systems as indicated on the drawings and as specified herein.

C. Motor control equipment specified under this section shall be the product of a single manufacture and shall be the same as that provided under Section 16480 unless stated otherwise.

D. Adjustable frequency drive systems work may include work in new motor control centers and/or work in existing motor control centers. Refer to the drawings for detailed description of the work.

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300.

B. Submit shop drawings for the equipment specified herein in accordance with the requirements specified under Section 16480, which state that submittals for all motor control equipment be included as part of the submittal for the complete, integrated process instrumentation and control system and in accordance with the requirements specified under Section 16900.

C. In addition to the requirements of Section 16480, the following information shall be submitted specifically for adjustable frequency drive systems:
1. Submit harmonic voltage distortion analysis based upon the minimum three phase bolted fault short circuit current available at the point of service. Submittal data shall not relieve contractor of specified performance requirements. Analysis shall include:
   a. Calculate percent voltage distortion, with respect to fundamental voltage, for all harmonics up to the 99th.
   b. Comparison with IEEE 519 standards for acceptable voltage distortions on such systems.

1.05 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS

A. Submit operation & maintenance manuals and instructions in accordance with Section 01300.

B. Submit operation and maintenance manuals for the equipment specified herein in accordance with the requirements specified under Section 16480, which state that submittals for all motor control equipment be included as part of the submittal for the complete, integrated process instrumentation and control system and in accordance with the requirements specified under Section 16900.

C. The following information shall be provided specifically for adjustable frequency drive systems:
1. Motor controller data listing identifying the configured values of all adjustable settings and configurable parameters.

1.06 QUALITY ASSURANCE

A. All materials, equipment, and parts shall be new and unused of current manufacture.

B. System supplier shall be responsible for providing all necessary accessories required for a complete and operable system.

C. Manufacturer Qualifications:
   1. All equipment provided under this section shall be the products of a single company specializing in manufacturing products specified in this section, with not less than twenty years of documented experience.
   2. The adjustable frequency drive system manufacturer shall have been engaged in the manufacture of PWM style adjustable frequency drives for a minimum of ten years.

D. Products: Listed and classified by UL or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

E. Adjustable frequency drive system manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Eaton/Cutler-Hammer, SVX-9000 Series.

2.02 GENERAL

A. Provide adjustable frequency, drive control systems capable of converting the scheduled voltage, 3-phase, 60 Hz, input power into variable voltage, adjustable frequency, 3-phase output of suitable capacity and waveform to serve as input power to squirrel cage induction motors of the scheduled characteristics (constant or variable torque).

B. Harmonic Distortion:
   1. The adjustable frequency drive systems shall operate satisfactorily when connected to a bus supplying other solid state power conversion equipment which may be causing up to 10 percent total harmonic voltage distortion and commutation notches up to 36,500 volt microseconds, or when operated from the same bus.
   2. Individual or simultaneous operation of the adjustable frequency drive systems shall not add more than 5 percent total harmonic voltage distortion to the normal bus, nor more than 10 percent while operating from the standby generator in accordance with IEEE 519, 1992.
   3. Maximum total and individual harmonic current distortion limits for each odd harmonic shall not exceed those set forth by IEEE 519, Latest Edition.
   4. If harmonic filters or reactors are needed to meet these requirements, then the manufacturer shall provide and be responsible for the design and manufacture of these items.

2.03 RATINGS

A. The drive shall accept an input voltage of the nominal three phase voltage indicated on the drawings, plus or minus 10 percent.

B. Displacement power factor: shall range between 1.0 and 0.95, lagging, over the entire speed range.

C. Efficiency: minimum of 97 percent at full load and speed.

D. Environmental Ratings:
1. Storage ambient temperature range: -40 to 70 degrees C.
2. Operating ambient temperature range: 0 to 40 degrees C without derating.
3. Relative humidity range: 5 to 95 percent non-condensing.
4. Operating elevation: up to 1000 meters without derating.

E. Provide redundant, thermostatically controlled ventilation fans to maintain interior of drive enclosure within the specified environmental ratings.

F. Output power Ratings:
1. The output voltage shall be adjustable from 0 to rated input voltage.
2. The output frequency range shall adjustable from 0 to 400Hz.
3. The inverter section shall produce a pulse width modulated (PWM) waveform using latest generation IGBTs.

2.04 DRIVE UNIT DESIGN

A. Hardware:
1. Utilize diode or fully gated bridge on the input.
2. Utilize DC bus inductor on all drives rated 7.5hp or greater.
3. Utilize switching logic power supply operating from the DC bus.
4. Incorporate phase to phase and phase to ground MOV protection.
5. Utilize gold plated plug-in connections on printed circuit boards.
6. Microprocessor based inverter logic shall be isolated from power circuits.
7. Utilize latest generation IGBT inverter section.
8. Inverter section shall not require commutation capacitors.
9. Employ interface common for all horsepower ratings. Interface shall include a LCD digital display and programming keypad.
10. Utilize a main control board with common control connections for all ratings.

B. Control Design:
1. The drive design shall be optimized for NEMA Design B motors.
2. The drive design shall allow for operation of the drive with the motor disconnected.
3. Provide a controlled shut down, when properly fused, with no component failure in the event of an output phase to phase or phase to ground short circuit. Provide annunciation of the fault condition.
4. Utilize an adjustable PWM carrier frequency within a range of 2 to 8 kHz to help eliminate audible noise.
5. Provide either Selectable Sensorless Vector or V/Hz modes.
6. The drive shall have the capability of selecting operation for either variable or constant torque loads. Selection of variable torque shall provide 115 percent of rated VT current for up to one minute. Selection of constant torque shall provide 150 percent of rated CT current for up to one minute.
7. Provide multiple programmable stop modes including:
   a. Ramp
   b. Coast
   c. DC-Brake
   d. Ramp-to-Hold

e. S-Curve

8. Provide multiple acceleration and deceleration rates.
9. The drive shall have an adjustable output frequency up to 400Hz.
10. The drive shall be capable of sensing a loss of the speed reference.
11. All adjustments shall be made with the door closed.

C. Power Conditioning:

1. The drive shall be designed to operate on an AC line which may contain line notching and up to 10 percent harmonic distortion.
2. An input isolation transformer shall not be required for protection from normal line transients. If line conditions dictate the use of a transformer, the K factor shall be 4.0 or less.

2.05 DRIVE UNIT FEATURES

A. Control Mode:

1. Selectable sensorless vector or V/Hz mode selectable through programming.
2. The sensorless vector mode shall use motor nameplate data plus motor operating data such as IR drop, nominal flux current and flux up time.
3. The volts per hertz mode shall be programmable for squared, cubed, straight line, pre-programmed or full custom patterns.

B. Current Limit:

1. Programmable current limit from 20 to 160 percent of constant torque rating.
2. Current limit shall be active for all drive states: accelerating, constant speed and decelerating.
3. The drive shall employ PI regulation with an adjustable gain for smooth transition in and out of current limit.

C. Acceleration / Deceleration:

1. Accel/Decel settings shall provide separate adjustments to allow either setting to be adjusted from 0 to 3600 seconds.
2. A second set of remotely selectable Accel/Decel settings shall be accessible through the control interface.
3. An adaptive current limit circuit shall be available and capable of being disabled through programming for fast acceleration of low inertia loads.

D. Speed Regulation Modes:

1. Open Loop.
2. Slip Compensation with 0.5 percent speed regulation.
3. Droop - Negative Slip Compensation with 0.5 percent speed regulation.
4. Traverse Function.
5. Closed loop encoder feedback with 0.1 percent speed regulation.
6. Process PI control.

E. Speed Profiles:

1. Programming capability shall allow the user to produce speed profiles with linear acceleration/deceleration or "S-Curve" profiles that provide changing accel/decel rates.
2. S-Curve profiles shall be selectable for fixed or adjustable values.

F. Adjustments:
   1. A digital interface shall be used for all set-up, operation and adjustment settings.
   2. All adjustments shall be stored in nonvolatile memory (EEPROM).
   3. No potentiometer adjustments shall be required.
   4. The drive shall provide EEPROM memory for factory default values.

G. Process PI Control:
   1. The drive shall incorporate an internal process PI regulator with proportional and integral gain adjustments as well as error inversion and output clamping functions.
   2. The feedback shall be configurable for normal or square root functions. If the feedback indicates that the process is moving away from the setpoint, the regulator shall adjust the drive output until the feedback equals the reference.
   3. Process control shall be capable of being enabled or disabled with a hardwire input. Transitioning in and out of process control shall be capable of being tuned for faster response by preloading the integrator.
   4. Protection shall be provided for a loss of feedback or reference signal.

H. Fault Reset / Run:
   1. The drive shall provide up to nine automatic fault reset and restarts following a fault condition before locking out and requiring manual restart.
   2. Ground fault, shorted output faults, and other internal microprocessor faults shall not automatically reset/restart.
   3. The time between restarts shall be adjustable from 0.5 to 30 seconds.

I. Skip Frequencies:
   1. Three adjustable set points that lock out continuous operation at frequencies which may produce mechanical resonance shall be provided.
   2. The set points shall have a bandwidth adjustable from 0 to 15Hz.

J. Run on Power Up:
   1. A user programmable restart function shall be provided to automatically restart the equipment after restoration of power after an outage.

K. Line Loss Restart:
   1. The drive shall have a line loss restart function. This programmable function shall select the reconnect mode of the drive after recovery from a line loss condition.
   2. The reconnect modes shall be Last Speed, Speed Search, Track Volts, or Use Encoder.
   3. This feature shall be capable of being disabled thus forcing the drive to start from zero hertz.

L. Fault Memory:
   1. The last four faults as well as operating frequency, drive status and power mode shall be stored at the time of fault.
   2. Information shall be maintained in the event of a power loss.

M. Overload Protection:
   1. The drive shall provide internal Class 10 motor overload protection investigated by UL to comply with N.E.C. Article 430.
   2. Overload protection shall be speed sensitive and adjustable for motors with speed ranges of 2:1, 4:1 and 10:1.

3. A viewable parameter shall store the overload usage in percent.
4. An alarm bit shall be available to adjust a process to eliminate an overload trip.

N. Auto Economizer:
1. An auto economizer feature shall automatically reduce the output voltage when the drive is operating in an idle mode (drive output current less than programmed motor FLA). The voltage shall be reduced to minimize flux current in a lightly loaded motor thus reducing kW usage. If the load increases, the drive shall automatically return to normal operation.

O. Flying Start:
1. The drive shall be capable of determining the speed and direction of a spinning motor and adjust its output to "pick-up" the motor at the rotating speed.
2. The flying start feature shall be operable with or without encoder feedback.

P. Control Logic Ride Through:
1. The control logic shall be capable of "riding through" a power outage of up to 2 seconds in duration.

Q. Inertia Ride Through:
1. The drive shall respond to a loss of AC input power by adjusting the output frequency to create a regenerative situation in the motor. The regenerated energy shall be used to power the drive logic during the power outage.
2. The amount of voltage drop required to trigger inertial ride through and the level at which regulation occurs shall both be adjustable.
3. Inertia ride through shall be capable of being enable or disable through programming.

R. Inputs and Outputs:
1. The standard Input / Output board shall consist of both analog and digital I/O.
2. No jumpers or switches shall be required to configure inputs and outputs. All functions shall be fully programmable.
3. The Input / Output board shall have the following analog inputs as standard.
   a. Quantity one (1) differentially isolated plus or minus 10V (bi-polar) / 20mA, 11 bit plus sign, 10V common mode noise rejection
   b. Quantity one (1) differentially isolated plus or minus 10V (bi-polar) / 20mA, 11 bit plus sign, 160V common mode noise rejection
   c. Analog inputs shall be user programmable for a variety of uses including frequency command and process loop input. Analog inputs shall be user programmable for function scaling (including invert), offset, signal loss detect and square root.
4. The Input / Output board shall have the following analog outputs as standard.
   a. Quantity one (1) differentially isolated plus or minus 10V (bi-polar) / 20mA, 11 bit plus sign.
   b. The analog output shall be user programmable to be proportional to one of fourteen process parameters including output frequency, output current, encoder feedback, output power.
   c. Programming shall be available to select either absolute or signed values of these parameters.
5. The Input / Output board shall have the following digital inputs as standard.
   a. Quantity of six (6) digital inputs rated 115Vac

b. All inputs shall be individually programmable for functions from a list of twenty-nine (29) that includes Start, Run, Stop, External Fault, Speed Select, Jog and Process PI functions.

6. The Input / Output board shall have the following digital outputs as standard.
   a. Quantity of two (2) relay outputs, form C (1 N.O. - 1 N.C.)
   b. Contact output ratings shall be 250Vac / 30Vdc (2.0 Amps maximum), resistive or inductive.
   c. Relays shall be programmable to twenty-six (26) different conditions including Fault, Alarm, At Speed, Drive Ready and PI Excess Error.
   d. Timers shall be available for each output to control the amount of time, after the occurring event, that the output relay actually changes state.

S. Reference Signals:
1. The drive shall be capable of using the following input reference signals
   a. Analog inputs
   b. Preset speeds
   c. Remote potentiometer
   d. Digital MOP
   e. Human Interface
   f. Communication module commands

T. Communication:
1. The drive shall be capable of communicating with a DeviceNet network and also with an Ethernet network.

U. Loss of Reference:
1. In the event of loss of the reference signal, the drive shall be user programmable to the following:
   a. Fault the drive
   b. Alarm and maintain last reference
   c. Alarm and go to preset speed
   d. Alarm and go to minimum speed
   e. Alarm and go to maximum speed
   f. Alarm and maintain last output frequency

V. Metering:
1. The following parameters shall be accessible through the human interface module:
   a. Output Current in Amps
   b. Output Voltage in Volts
   c. Output Power in kW
   d. Elapsed MWh
   e. DC Bus Voltage
   f. Output Frequency
   g. Heatsink Temperature
   h. Last eight (8) faults
   i. Elapsed Run Time

W. Faults:
1. Fault information shall be accessible through the human interface module.

2. A fault buffer shall store the last four faults in a first-in / first-out manner.
3. At a minimum the following faults shall be displayed:
   a. Power Loss.
   b. Undervoltage.
   c. Overvoltage.
   d. Overload.
   e. Overtemperature (Heat Sink).
   f. Overcurrent detected in instantaneous overcurrent trip circuit
   g. Maximum retries.
   h. Phase-to-phase and phase-to-ground faults.

2.06 DISCONNECTING MEANS

A. Provide a door interlocked motor circuit protector disconnect

B. Operator Handles
1. Provide flange mounted operator handles for free standing units
2. Provide through the door operating handles for wall mounted units
3. Refer to requirements of Section 16480 for motor control center mounted equipment.
4. Handles shall be padlockable

C. The system shall be rated for the available fault current identified on the drawings. The rating shall be shown on the drive label.

2.07 DRIVE INPUT FUSES

A. Provide drive input fuses to provide branch circuit protection for the drive.

B. The drive input fuses shall be selected by the manufacturer and mounted in fuse blocks.

2.08 CONTROL POWER TRANSFORMER

A. Provide a control power transformer mounted and wired inside of the drive system enclosure.

B. The transformer shall be rated for drive power plus 250VA for customer use.

2.09 CONTACTORS

A. General:
1. Contactors shall be IEC or NEMA rated devices suitable for the application intended.
2. Provide Isolation contactors where indicated on the drawings.

B. Isolation:
1. Input contactor shall provide positive isolation of the controller from line power.
2. Input contactor shall close when motor is signaled to start, energizing the controller and allowing adjustable speed control.
3. Input contactor shall open after the controller has stopped the motor and de-energize the controller.
4. Input contactor shall not switch loaded motor under any circumstances.

2.10 POWER CONDITIONING EQUIPMENT

A. General:
   1. Provide Input Line Reactors where indicated on the drawings.

B. Common Mode Choke:
   1. Provide a common mode choke at the drive output to help, in conjunction with the proper grounding techniques, reduce or eliminate interference with sensitive electronic equipment or communication devices installed in the same system.

C. Input Line Reactor:
   1. Provide a drive input line reactor mounted within the drive system enclosure
   2. The line reactor shall meet the following specifications:
      a. The construction shall be iron core with an impedance of (3) percent
      b. The winding shall be copper wound.
      c. The insulation shall be Class H with a 115 degree C rise.
      d. The unit shall be rated for system voltage and frequency

2.11 PILOT CONTROL DEVICES

A. Provide front of panel mounted pilot devices as shown on drawings.

2.12 ENCLOSURES

A. The enclosure shall be NEMA 1 as indicated on the contract drawings.

B. Starters shall have an adjustable instantaneous motor circuit protector (HMCP) type disconnect device.

PART 3 - CONSTRUCTION METHODS

3.01 FIELD MEASUREMENTS

A. Field verify all measurements. Do not base exact equipment locations locations on the contract drawings.

B. Identify conflicts with the work of other trades prior to installation of electrical equipment.

C. Identify deviation from physical sizes shown on the drawings to Engineer prior to bid date.

D. Contractor shall be responsible for modifications to the installation due to deviations from physical sizes shown on the drawings.

E. Identify conflicts with the work of other trades prior to installation of electrical equipment.

F. Record nameplate data for each motor served.

3.02 DELIVERY, STORAGE, AND HANDLING

A. Accept adjustable frequency motor controllers on site. Inspect for damage.

B. The Contractor shall be responsible for all equipment necessary to receive, unload, move into building, and install motor control centers.

C. The Contractor shall be responsible for coordinating specific shipping split requirements with the manufacturer/supplier.

D. Conform to written instructions of manufacturer.

E. Protect adjustable frequency motor controllers from corrosion and entrance of debris.

F. Store adjustable frequency motor controllers above grade. Protect from environment with suitable covering.

3.03 INSTALLATION

A. Adjust disconnecting means trip settings to satisfy motor nameplate requirements.

B. Record information for motor data labels and install motor data labels.

C. Adjust all programmable drive features, including but not limited to auto restart parameters. The drive system must automatically restart after a power fail condition.

D. Provide typed label inside each unit identifying configured values for all programmable drive parameters.

E. Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of all connections.

F. Verify that cooling fans are operating properly.

G. Thoroughly clean and remove construction debris from filters, enclosure interior, and exterior.

3.04 TESTING AND START-UP SERVICES

A. Refer to the requirements of Section 26 90 00 - Process Instrumentation & Control.

3.05 TRAINING

A. Refer to the requirements of Section 26 90 00 - Process Instrumentation & Control.

END OF SECTION

SECTION 16482

MOTOR CONTROLLERS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.
   1. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
      a. NFPA 70 - National Electrical Code.
   2. Canadian Standards Associates (CSA), Specifications and Standards, Current Edition.
   3. European Committee for Electrotechnical Standardization (CENELEC), Current Edition.
      a. EN 60947 - Low-Voltage Switchgear and Controlgear - Part 4-2: Contactors and Motor-Starters - AC Semiconductor Motor Controllers and Starters
   4. Electrical and Electronic Manufacturers Association Canada (EEMAC), Specifications and Standards, Current Edition.
   5. International Electrotechnical Association (IEC), Specifications and Standards, Current Edition:
      a. IEC-60439 - Low Voltage Switchgear and Control Gear Assemblies.
   6. National Electrical Contractors Association (NECA), current edition.
      a. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting.
   7. National Electrical Manufacturers Association (NEMA), Specifications and Standards, Current Edition:
      a. ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays Rated 600 Volts.
      b. ICS 4-2000 - Industrial Control and Systems: Terminal Blocks.
      c. ICS 5-2000 - Industrial Control and Systems: Control Circuit and Pilot Devices.
      d. ICS 6-1993 - Industrial Control and Systems Enclosures.
   8. Underwriters Laboratories, Inc. (UL), Specifications and Standards, Current Edition:
      a. UL 508 - Industrial Control Equipment.

1.03 DESCRIPTION OF WORK

A. For the purpose of obtaining a complete and integrated process instrumentation and control system, the work specified herein shall be included under the scope of:
   1. Section 16480 - Motor Control Centers
   2. Section 16900 - Process Instrumentation & Control

B. Furnish and install complete and operable motor controllers as indicated on the drawings and as specified herein.

C. Motor control equipment specified under this section shall be the product of a single manufacture and shall be the same as that provided under Section 16480 unless stated otherwise.

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300.

B. Submit shop drawings for the equipment specified herein in accordance with the requirements specified under Section 16480, which state that submittals for all motor control equipment be included as part of the submittal for the complete, integrated process instrumentation and control system and in accordance with the requirements specified under Section 16900.

1.05 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS

A. Submit operation & maintenance manuals and instructions in accordance with Section 01300.

B. Submit operation and maintenance manuals for the equipment specified herein in accordance with the requirements specified under Section 16480, which state that submittals for all motor control equipment be included as part of the submittal for the complete, integrated process instrumentation and control system and in accordance with the requirements specified under Section 16900.

C. The following information shall be provided specifically for motor controllers:
   1. Motor controller data listing identifying the configured values of all adjustable settings and configurable parameters.

1.06 QUALITY ASSURANCE

A. All materials, equipment, and parts shall be new and unused of current manufacture.

B. System supplier shall be responsible for providing all necessary accessories required for a complete and operable system.

C. Manufacturer Qualifications: All motor controllers provided under this section shall be the products of a single company specializing in manufacturing products specified in this section, with not less than twenty years of documented experience.

D. Products: Listed and classified by UL or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

E. Motor Control Center manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Eaton/Cutler-Hammer.

2.02 ELECTROMECHANICAL MOTOR CONTROLLERS

A. Overload Protection:
   1. General:

a. Provide Type 2 overload protection where indicated on the drawings.
b. Provide Type 1 overload protection where indicated on the drawings and for all motor controllers where overload protection type is not specified on the drawings.

2. Type 1 Overload Protection:
   a. Motor starter units shall have a 3-pole manual reset solid-state overload relays with alarm contacts and providing Class 20 operation with the following protection features:
      1) Over current.
      2) Phase loss.
      3) Ground fault.
      4) Jam protection.

3. Type 2 Overload Protection:
   a. Motor starter units shall have a manual reset electronic overload relay that incorporates the following features:
      1) On-board DeviceNet communications.
      2) LEDs for status indication.
      3) Test/Reset button.
      4) Adjustable trip of NEMA Class 5 to 30. Unless indicated, the trip class shall be set for NEMA Class 20 operation.
      5) Four inputs and two outputs. Refer to the drawings for connection requirements.
      6) Protective Functions:
         (a) Functions shall provide a programmable trip level, warning level, time delay, and inhibit window.
         (b) Protective functions shall include thermal overload, underload, jam, current imbalance, stall, phase loss, zero sequence ground fault (if specified), and PTC thermistor input (if specified on drawings).
      7) Current Monitoring functions shall include phase current, average current, full load current, current imbalance percent, percent thermal capacity utilized and ground fault current (if specified).
      8) Diagnostic Information shall include device status, warning status, time to reset, trip status, time to overload trip, and history of last five trips.

B. Non-Reversing Starters:
   1. Magnetic starters through NEMA Size 9 shall be equipped with double-break silver alloy contacts. The starter must have straight-through wiring. Each starter shall have one (1) NO auxiliary contact
   2. Coils shall be permanently marked with voltage, frequency and part number
   3. NEMA Size 00 through 2 starters shall be suitable for the addition of at least six (6) external auxiliary contacts of any arrangement normally open or normally closed. Size 3 through 8 starters shall be suitable for the addition of up to eight (8) external auxiliary contacts of any arrangement normally open or normally closed

2.03 ENCLOSURES

A. The enclosure shall be NEMA 1 as indicated on the contract drawings.

B. Starters shall have an adjustable instantaneous motor circuit protector (HMCP) type disconnect device.

PART 3 - CONSTRUCTION METHODS

3.01 FIELD MEASUREMENTS

A. Field verify all measurements. Do not base exact motor controller locations locations on the contract drawings.

B. Identify conflicts with the work of other trades prior to installation of electrical equipment.

C. Identify deviation from physical sizes shown on the drawings to Engineer prior to bid date.

D. Contractor shall be responsible for modifications to the installation due to deviations from physical sizes shown on the drawings.

E. Identify conflicts with the work of other trades prior to installation of electrical equipment.

F. Record nameplate data for each motor served.

G. Adjust motor controller installation to satisfy field requirements.

3.02 DELIVERY, STORAGE, AND HANDLING

A. Accept motor controller on site. Inspect for damage.

B. The Contractor shall be responsible for all equipment necessary to receive, unload, move into building, and install motor control centers.

C. Conform to written instructions of manufacturer.

D. Protect motor controllers from corrosion and entrance of debris.

E. Store motor controllers above grade. Protect from environment with suitable covering.

3.03 INSTALLATION

A. Adjust disconnecting means trip settings to satisfy motor nameplate requirements.

B. Provide overload relays sized and adjusted for the actual nameplate data recorded for each motor. No additional compensation will be allowed due to failure to select overload devices based upon actual motor nameplate data.

C. Record information for motor data labels and install motor data labels.

D. Install motor controllers plumb and flush with wall finishes.

E. Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of all connections.

F. Thoroughly clean and remove construction debris from panelboard interior and exterior.

3.04 TESTING AND START-UP SERVICES

A. Refer to the requirements of Section 26 90 00 - Process Instrumentation & Control.

3.05 TRAINING

A. Refer to the requirements of Section 26 90 00 - Process Instrumentation & Control.

END OF SECTION

SECTION 16495

TRANSFER SWITCH

PART 1 - GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 1 shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.

1. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
   a. NFPA20 – Fire Pumps. Transfer switches serving fire pumps shall be specifically listed and labeled for that application.
   b. NFPA70 – National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
   c. NFPA99 – Essential Electrical Systems for Health Care Facilities.
   d. NFPA110 – Emergency and Standby Power Systems. The transfer switch shall meet all requirements for Level 1 systems.
2. Canadian Standards Association (CSA), Specifications and Standards, current edition:
   a. CSA C22.2, No. 14 – M91 Industrial Control Equipment.
   b. CSA 282, 1989 Emergency Electrical Power Supply for Buildings.
3. European Committee for Electrotechnical Standardization (CENELEC), Specifications and Standards, current edition:
   a. EN55011, Class B Radiated Emissions.
   b. EN55011, Class B Conducted Emissions.
4. International Electrotechnical Commission (IEC), Specifications and Standards, current edition:
   a. IEC 1000-4-2 (EN 61000-4-2) Electrostatic Discharge Immunity.
   b. IEC 1000-4-3 (EN 61000-4-3) Radiated Field Immunity.
   c. IEC 1000-4-4 (EN 61000-4-4) Fast Transients Immunity.
   d. IEC 1000-4-5 (EN 61000-4-5); AC Surge Immunity. Similar waveforms are described in ANSI/IEEE 62.41-1991.
   e. IEC 1000-4-6 Conducted Field Immunity.
   f. IEC 1000-4-11 Voltage Dip Immunity.
5. Institute of Electrical and Electronics Engineers, Specifications and Standards, current edition:
   a. IEEE446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.
6. National Electrical Manufacturers Association (NEMA), Specifications and Standards, current edition:
   a. NEMA ICS10-1993 – AC Automatic Transfer Switches.
7. Underwriters Laboratories, Inc. (UL), Specifications and Standards, current edition:
   a. UL1008. The transfer switch shall be UL listed and labeled.

1.03 DESCRIPTION OF WORK

A. Provide complete factory assembled power transfer equipment with field programmable digital electronic controls designed for fully automatic operation and including: surge voltage isolation, voltage sensors on all phases of both sources, linear operator, permanently attached manual handles, positive mechanical and electrical interlocking, and mechanically held contacts for both sources.

B. Provide factory test, startup by a supplier authorized by the manufacturer, and on-site testing of the system. Technicians specifically trained to support the product and employed by the generator set supplier shall service the transfer switches.

C. The generator set manufacturer shall warrant transfer switches to provide a single source of responsibility for all the products provided.

D. The automatic transfer switch specified herein shall be equipped with a time delay in the neutral position (programmed transition). Alternative methods for transfer control are not acceptable.

1.04 RELATED WORK ELSEWHERE

A. For the purpose of obtaining a complete and integrated standby power system, the following sections shall be included under the scope of this section:
   1. Section 16622 – Standby Engine/Generator Set.

B. The following sections include work which is related to the Standby Engine/Generator Set, but which is not included under the scope of this section:
   1. Division 15 – Mechanical.
   2. Division 16 – Electrical.

1.05 SHOP DRAWINGS

A. Submit shop drawings in accordance with Division 1.

B. General requirements specific to this section include:
   1. Submit complete and integrated document containing all equipment included under the scope of this section as part of the submittal document for the Standby Engine/Generator Set.
   2. Submittal shall be complete, neat, orderly, and indexed with tabbed dividers. Partial submittals will not be accepted.
   3. Clarity and completeness are of prime importance. Acceptability of submittal drawings shall be at the sole discretion of the Engineer in regards to this requirement.
   4. Additional requirements for the various subsystems are specified in the corresponding sections.

C. Submit the following information:
   1. Manufacturer's product literature and performance data, sufficient to verify compliance to specification requirements.
   2. A paragraph-by-paragraph specification compliance statement, describing the differences between the specified and the proposed equipment.
   3. Manufacturers published warranty documents.
   4. Shop drawings showing plan and elevation views with certified overall dimensions, as well as wiring interconnection details.
   5. Interconnection wiring diagrams showing all external connections required; with field wiring terminals marked in a consistent point-to-point manner.
   6. Manufacturer's installation instructions.

1.06 FACTORY TESTING

A. The generator set supplier shall perform a complete operational test on the automatic transfer switch prior to shipping from the factory. A certified test report shall be provided. Equipment supplied shall be fully tested at the factory for function and performance.

B. Factory testing may be witnessed by the owner and consulting engineer. Costs for travel expenses will be the responsibility of the owner and consulting engineer. Supplier is responsible to provide two weeks notice for testing.

C. Test process shall include calibration of voltage sensors.

1.07 OPERATION & MAINTENANCE MANUALS AND INSTRUCTIONS

A. Submit Operation & Maintenance Manuals and Instructions in accordance with Division 1.

B. Submit final revised shop drawings incorporating any modifications made as a result of installation, start-up, operational testing, or for any other cause. Submit results of all field-testing and corrective actions taken for all operational parameters.

C. Submit manufacturers standard operation & maintenance information including installation manuals and safety instructions.

D. Submit contact list identifying names, addresses, telephone numbers, and any additional contact information for each equipment service organization involved with the Standby Engine/Generator Set.

E. Submit detailed operation and maintenance procedures for each major equipment item; include description of operation for all modes of operation, routine maintenance procedures, and trouble-shooting guide.

F. Submit listing spare parts provided under this contract and of recommended additional spare parts not provided under this contract along with costs.

1.08 QUALITY ASSURANCE

A. The Automatic Transfer Switch manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

B. All materials, equipment, and parts shall be new and unused of current manufacture.

C. System supplier shall be responsible for providing all necessary accessories required for a complete and operable system.

D. The Automatic Transfer Switch manufacturer shall have been engaged in the manufacture of generator sets for a minimum of ten years and shall have a factory trained service and parts organization located within 100 miles of the jobsite.

E. All control equipment shall be the standard product of the engine/generator set manufacturer. Controls systems that are supplied by a subcontractor of the manufacturer and which are not incorporated into the standard documentation of the manufacturer will not be acceptable.

1.09 WARRANTY

A. The generator set and associated equipment shall be warranted for a period of not less than five years from the date of commissioning against defects in materials and workmanship.

B. The warranty shall be comprehensive. No deductibles shall be allowed for travel time, service hours, repair parts cost, etc.

C. The manufacturer of the transfer switch shall maintain service parts inventory at a central location that is accessible to the service location twenty-four hours per day, three hundred sixty-five days per year.

D. The generator set shall be serviced by a local service organization that is trained and factory certified in generator set service. The supplier shall maintain an inventory of critical replacement parts at the local service organization, and in service vehicles. The service organization shall be on call twenty-four hours per day, three hundred sixty-five days per year.

E. The manufacturer shall maintain model and serial number records of each transfer switch provided for at least twenty years.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Acceptable Manufacturers
   1. Cummins/Onan.
   2. Kohler Power Systems
   3. Caterpillar/Olympian.

B. The automatic transfer switch shall be provided as part of a complete, integrated standby power system. As such, the manufacturer of the Standby Engine/Generator Set shall provide it.

2.02 POWER TRANSFER SWITCH

A. Ratings
   1. Refer to the project drawings for specifications on the sizes and types of transfer switch equipment, withstand and closing ratings, number of poles, voltage and ampere ratings, enclosure type, and accessories.
   2. Main contacts shall be rated for 600 Volts AC, minimum.
   3. Transfer switches shall be rated to carry 100 percent of rated current continuously in the enclosure supplied, in ambient temperatures of -40 to +60 degrees C, relative humidity up to 95 percent (non-condensing), and altitudes up to 10,000 feet (3000M).
   4. Transfer switch equipment shall have withstand and closing ratings (WCR) in RMS symmetrical amperes greater than the available fault currents shown on the drawings and at the specified voltage. The transfer switch and its upstream protection shall be coordinated. The transfer switch shall be third party listed and labeled for use with the specific protective device(s) installed in the application.

B. Construction
   1. Transfer switches shall be double-throw, electrically and mechanically interlocked, and mechanically held in the source 1 and source 2 positions. The transfer switch shall be specifically designed to transfer to the best available source if it inadvertently stops in a neutral position.
   2. Transfer switches rated through 1000 amperes shall be equipped with permanently attached manual operating handles and quick-break, quick-make over-center contact

mechanisms. Transfer switches over 1000 amperes shall be equipped with manual operators for service use only under de-energized conditions.

3. Main switch contacts shall be high-pressure silver alloy. Contact assemblies shall have arc chutes for positive arc extinguishing. Arc chutes shall have insulating covers to prevent inter-phase flashover.
4. Transfer switch internal wiring shall be composed of pre-manufactured harnesses that are permanently marked for source and destination. Harnesses shall be connected to the control system by means of locking disconnect plug(s), to allow the control system to be easily disconnected and serviced without disconnecting power from the transfer switch mechanism.
5. Power transfer switch shall be provided with flame retardant transparent covers to allow viewing of switch contact operation but prevent direct contact with components that could be operating at line voltage levels.
6. Transfer switches designated as 4-pole switches on the drawings shall be provided with a switched neutral pole. The neutral pole shall be of the same construction and have the same ratings as the phase poles. All poles shall be switched simultaneously using a common crossbar. Substitute equipment using overlapping neutral contacts is not acceptable.
7. Transfer switches designated as 3-pole switches on the drawings shall be provided with a neutral bus and lugs. The neutral bus shall be sized to carry 100 percent of the current designated on the switch rating.

C. Connections

1. Field control connections shall be made on a common terminal block that is clearly and permanently labeled.
2. Transfer switch shall be provided with AL/CU mechanical lugs sized to accept the full output rating of the switch. Lugs shall be suitable for the number and size of conductors shown on the drawings.

2.03 TRANSFER SWITCH CONTROL

A. Operator Panel. Each transfer switch shall be provided with a control panel to allow the operator to view the status and control operation of the transfer switch. The operator panel shall be a sealed membrane panel rated NEMA 3R/IP53 or better (regardless of enclosure rating) that is permanently labeled for switch and control functions.

B. Operator panel and features and capabilities shall include:

1. High intensity LED lamps to indicate the source that the load is connected to (source 1 or source 2); and which source(s) are available. Source available LED indicators shall operate from the control microprocessor to indicate the true condition of the sources as sensed by the control.
2. High intensity LED lamps to indicate that the transfer switch is "not in auto" (due to control being disabled or due to bypass switch (when used) enabled or in operation) and "Test/Exercise Active" to indicate that the control system is testing or exercising the generator set.
3. "OVERRIDE" pushbutton to cause the transfer switch to bypass any active time delays for start, transfer, and retransfer and immediately proceed with its next logical operation.
4. "TEST" pushbutton to initiate a preprogrammed test sequence for the generator set and transfer switch. The transfer switch shall be programmable for test with load or test without load.
5. "RESET/LAMP TEST" pushbutton that will clear any faults present in the control, or simultaneously test all lamps on the panel by lighting them.

6. The control system shall continuously log information on the number of hours each source has been connected to the load, the number of times transferred, and the total number of times each source has failed. This information shall be available via a PC-based service tool or an operator display panel.
7. Security Key Switch to allow the user to inhibit adjustments, manual operation or testing of the transfer switch unless key is in place and operated.
8. Vacuum fluorescent alphanumeric display panel with push-button navigation switches. The display shall be clearly visible in both bright (sunlight) and no light conditions. It shall be visible over an angle of at least 120 degrees. The Alphanumeric display panel shall be capable of providing the following functions and capabilities:
   a. Display source condition information, including AC voltage for each phase of normal and emergency source, frequency of each source. Voltage for all three phases shall be displayed on a single screen for easy viewing of voltage balance.
   b. Display source status, to indicate source is connected or not connected.
   c. Display load data, including 3-phase AC voltage, 3-phase AC current, frequency, KW, KVA, and power factor. Voltage and current data for all phases shall be displayed on a single screen.
   d. The display panel shall allow the operator to view and make the following adjustments in the control system, after entering an access code:
      1) Set nominal voltage and frequency for the transfer switch.
      2) Adjust voltage and frequency sensor operation set points.
      3) Set up time clock functions.
      4) Set up load sequence functions.
      5) Enable or disable control functions in the transfer switch, including program transition.
      6) Set up exercise and load test operation conditions, as well as normal system time delays for transfer time, time delay start, stop, transfer, and retransfer.
   e. Display Real time Clock data, including date, and time in hours, minutes, and seconds. The real time clock shall incorporate provisions for automatic daylight savings time and leap year adjustments. The control shall also log total operating hours for the control system.
   f. Display service history for the transfer switch. Display source connected hours, to indicate the total number of hours connected to each source. Display number of times transferred, and total number of times each source has failed.
   g. Display information for other transfer switches in the system, including transfer switch name, real time load in KW on the transfer switch, current source condition, and current operating mode.
   h. Display fault history on the transfer switch, including condition, and date and time of fault. Faults to include controller checksum error, low controller DC voltage, ATS fail to close on transfer, ATS fail to close on retransfer, battery charger malfunction, network battery voltage low, network communications error.

C. Internal Controls
1. The transfer switch control system shall be field-configurable for any operating voltage level up to 600VAC. Provide RMS voltage sensing and metering that is accurate to within +/-1 percent of nominal voltage level. Frequency sensing shall be accurate to within +/-0.2 percent. Voltage sensing shall be monitored based on the normal voltage at the site. Systems that utilize voltage monitoring based on standard voltage conditions that are not field-configurable are not acceptable.
2. Transfer switch voltage sensors shall be close differential type, providing source availability information to the control system based on the following functions:

a. Monitoring all phases of the normal service (source 1) for under voltage conditions (adjustable for pickup in a range of 85 to 98 percent of the normal voltage level and dropout in a range of 75 to 98 percent of normal voltage level).
b. Monitoring all phases of the emergency service (source 2) for under voltage conditions (adjustable for pickup in a range of 85 to 98 percent of the normal voltage level and dropout in a range of 75 to 98 percent of pickup voltage level).
c. Monitoring all phases of the normal service (source 1) and emergency service (source 2) for voltage imbalance.
d. Monitoring all phases of the normal service (source 1) and emergency service (source 2) for loss of a single phase.
e. Monitoring all phases of the normal service (source 1) and emergency service (source 2) for phase rotation.
f. Monitoring all phases of the normal service (source 1) and emergency service (source 2) for over voltage conditions (adjustable for dropout over a range of 105 to 135 percent of normal voltage, and pickup at 95-99 percent of dropout voltage level).
g. Monitoring all phases of the normal service (source 1) and emergency service (source 2) for over or under frequency conditions.
h. Monitoring the neutral current flow in the load side of the transfer switch. The control shall initiate an alarm when the neutral current exceeds a preset adjustable value in the range of 100-150 percent of rated phase current for more than an adjustable period of 10 to 60 seconds.

3. All transfer switch sensing shall be configurable from a Windows 95, 98, 2000, or NT PC-based service tool, to allow setting of levels, and enabling or disabling of features and functions. Selected functions including voltage sensing levels and time delays shall be configurable using the operator panel. Designs utilizing DIP switches or other electromechanical devices are not acceptable. The transfer control shall incorporate a series of diagnostic LED lamps.
4. The transfer switch shall be configurable to control the operation time from source to source (program transition operation). The control system shall be capable of enabling or disabling this feature, and adjusting the time period to a specific value. A phase band monitor or similar device is not an acceptable alternate for this feature.
5. The transfer switch shall incorporate adjustable time delays for generator set start (adjustable in a range from 0-15 seconds); transfer (adjustable in a range from 0-120 seconds); retransfer (adjustable in a range from 0-30 minutes); and generator stop (cool down) (adjustable in a range of 0-30 minutes).
6. The transfer switch shall be configurable to accept a relay contact signal and a network signal from an external device to prevent transfer to the generator service.
7. The control system shall be designed and prototype tested for operation in ambient temperatures from -40C to +70C. It shall be designed and tested to comply with the requirements of the noted voltage and RFI/EMI standards.
8. The control shall have optically isolated logic inputs, high isolation transformers for AC inputs, and relays on all outputs, to provide optimum protection from line voltage surges, RFI and EMI.

D. Battery Charger

1. Provide the transfer switch with a battery charger for the generator set starting batteries. The battery charger shall be a float type charger rated 6 amps minimum. The battery charger shall include an ammeter for display of charging current and shall have fused AC inputs and DC outputs. The charger shall also include fault indications for high and low dc voltage, and supply power failed, and dry contacts for external indication of these fault conditions. Display supply power failed indication on the ATS control panel.

E. Control Interface

1. The transfer switch will provide an isolated relay contact for starting of a generator set. The relay shall be normally held open, and close to start the generator set. Output contacts shall be form C, for compatibility with any generator set.
2. Provide one set Form C auxiliary contacts on both sides, operated by transfer switch position, rated 10 amps 250 VAC.
3. Output relays shall be provided to indicate position and call for generator status of transfer switch and wired to TJB and RTU-A

2.04 ENCLOSURE

A. Enclosures shall be UL listed. The enclosure shall provide wire bend space in compliance to the latest version of NFPA70. The cabinet door shall include permanently mounted key type latches.

B. Transfer switch equipment shall be provided in a NEMA 1 or better enclosure.

C. Enclosures shall be the NEMA type specified. The cabinet shall provide code-required wire bend space at point of entry as shown on the drawings. Manual operating handles and all control switches (other than key-operated switches) shall be accessible to authorized personnel only by opening the key-locking cabinet door. Transfer switches with manual operating handles and/or non-key-operated control switches located on outside of cabinet do not meet this specification and are not acceptable.

2.05 OPERATION

A. Sequence of Operation

1. Transfer switch normally connects an energized utility power source (source 1) to loads and a generator set (source 2) to the loads when normal source fails. The normal position of the transfer switch is source 1 (connected to the utility), and no start signal is supplied to the genset.
2. Generator Set Exercise (Test) With Load Mode. The control system shall be configurable to test the generator set under load. In this mode, the transfer switch shall control the generator set in the following sequence:
   a. Transfer switch shall initiate the exercise sequence at a time indicated in the exercise timer program, or when manually initiated by the operator.
   b. The transfer switch shall issue a compatible start command to the generator set.
   c. When the control systems senses the generator set at rated voltage and frequency, it shall operate to connect the loads to the generator set by opening the normal source contacts, and closing the alternate source contacts a predetermined time period later. The timing sequence for the contact operation shall be programmable in the controller.
   d. The generator set shall operate connected to the load for the duration of the exercise period. If the generator set fails during this period, the transfer switch shall automatically reconnect the generator set to the normal service.
   e. On completion of the exercise period, the transfer switch shall operate to connect the loads to the normal source by opening the alternate source contacts, and closing the normal source contacts a predetermined time period later. The timing sequence for the contact operation shall be programmable in the controller.
   f. The transfer switch shall operate the generator set unloaded for a cool down period, and then remove the start signal from the generator set. If the normal power fails at any time when the generator set is running, the transfer switch shall immediately connect the system loads to the generator set.

3. Generator Set Exercise (Test) Without Load Mode. The control system shall be configurable to test the generator set without transfer switch load connected. In this mode, the transfer switch shall control the generator set in the following sequence:
   a. Transfer switch shall initiate the exercise sequence at a time indicated in the exercise timer program, or when manually initiated by the operator.
   b. The transfer switch shall issue a compatible start command to the generator set and cause the generator set to start and run at idle until it has reached normal operating temperature.
   c. When the generator set has reached normal operating temperature or after an adjustable time period (whichever is shorter), the control system shall accelerate the generator set to rated voltage and frequency.
   d. When the control systems senses the generator set at rated voltage and frequency, it shall operate the generator set unloaded for the duration of the exercise period.
   e. At the completion of the exercise period, the transfer switch shall remove the start signal from the generator set. If the normal power fails at any time when the generator set is running, the transfer switch shall immediately connect the system loads to the generator set.

PART 3 - CONSTRUCTION METHODS

3.01 DIVISION OF WORK

A. The Contractor shall have overall system responsibility and shall provide all materials and labor necessary provide a complete and operable system and comply with all requirements of this section.

B. The engine/generator set manufacturer shall be responsible for certifying the correctness of installation for all work related to the standby power system regardless of who performs the installation work.

C. The contract drawings are diagrammatic in nature; it shall be the responsibility of the manufacturer to supplement the contract drawings and complete the final design of the standby power system and to coordinate exact requirements with the installing contractors.

3.02 FIELD MEASUREMENTS

A. Field verify with exact measurements, the available mounting space for standby power system equipment. Identify deficiencies prior to beginning installation.

3.03 DELIVERY STORAGE AND HANDLING

A. It shall be the responsibility of the installing contractor to receive all standby power system equipment at the job site. Carefully inspect all equipment for damage prior to accepting from the shipping agency. Do not accept shipment if damage is evident.

B. Exercise due diligence in storing, protecting, and moving standby power system equipment. Damaged or worn equipment will not be accepted and will be replaced at no additional cost to the Owner.

3.04 INSTALLATION

A. Install equipment in locations as indicated on the contract documents. Adjust locations as needed to ensure operability, serviceability, and compliance with all applicable codes and standards.

B. Installation shall be completely tested prior to start-up. This work includes verification of all field wiring continuity and proper termination of wiring.

C. The contractor shall install the equipment in accordance with final submittals and contract documents. Installation shall comply with applicable state and local codes as required by the authority having jurisdiction. Install equipment in accordance with manufacturer's instructions and instructions included in the listing or labeling of UL listed products.

D. Installation of equipment shall include furnishing and installing all interconnecting wiring between all major equipment provided for the on-site power system. The contractor shall also perform interconnecting wiring between equipment sections (when required), under the supervision of the equipment supplier.

E. Equipment shall be initially started and operated by representatives of the manufacturer.

F. All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to final testing of the system.

3.05 TESTING AND START-UP SERVICES

A. Standby power system supplier shall provide installation and start-up services required to place the complete system into operation.

B. The complete installation shall be tested for compliance with the specification following completion of all site work. Representatives of the manufacturer shall conduct testing, with required fuel supplied by Contractor. The Engineer shall be notified in advance and shall have the option to witness the tests.

C. Installation acceptance tests to be conducted on-site shall include a "cold start" test, a two-hour full load test, and a one step rated load pickup test in accordance with NFPA 110.

D. Perform a power failure test on the entire installed system. This test shall be conducted by opening the power supply from the utility service, and observing proper operation of the system for at least 2 hours. Coordinate timing and obtain approval for start of test with site personnel.

E. Provide for one technician follow up visit within one month of commissioning for the purpose of consulting with the Owner and making any final adjustments, corrections, and repairs

3.06 TRAINING

A. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of the equipment provided as part of the owner training session specified under Standby Engine Generator Set.

- END OF SECTION -

SECTION 16622

STANDBY ENGINE/GENERATOR SET

PART 1 - GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of Division 1 shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.

1. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
   a. NFPA70 – National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
   b. NFPA99 – Essential Electrical Systems for Health Care Facilities.
   c. NFPA110 – Emergency and Standby Power Systems. The generator set shall meet all requirements for Level 1 systems. Perform level-one prototype tests required by this standard on a complete and functional unit; component level type tests will not substitute for this requirement.
2. Canadian Standards Association (CSA), Specifications and Standards, current edition:
   a. CSA C22.2, No. 14 – M91 Industrial Control Equipment.
   b. CSA 282, 1989 Emergency Electrical Power Supply for Buildings.
3. European Committee for Electrotechnical Standardization (CENELEC), Specifications and Standards, current edition:
   a. EN50082-2, Electromagnetic Compatibility – Generic Immunity Requirements, Part 2: Industrial.
   b. EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment.
4. Federal Communications Commission (FCC), Specifications and Standards, current edition:
   a. FCC Part 15, Subpart B.
5. International Electrotechnical Commission (IEC), Specifications and Standards, current edition:
   a. IEC8528 part 4. Control Systems for Generator Sets.
   b. IEC Std 801.2, 801.3, and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions.
6. Institute of Electrical and Electronics Engineers, Specifications and Standards, current edition:
   a. IEEE446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.
   b. IEEE587 for voltage surge resistance.
7. Military Standard (MIL), Specifications and Standards, current edition:
   a. Mil Std 461D –1993. Military Standard, Electromagnetic Interference Characteristics.
   b. Mil Std 462D - 1993. Military Standard, Measurement of Electromagnetic Interference Characteristics.
8. National Electrical Manufacturers Association (NEMA), Specifications and Standards, current edition:

a. NEMA ICS10-1993 – AC Generator sets.

9. Underwriters Laboratories, Inc. (UL), Specifications and Standards, current edition:
   a. UL2200. The genset shall be listed to UL2200 or submit to an independent third party certification process to verify compliance as installed.
   b. UL508. The entire control system of the generator set shall be UL508 listed and labeled.

1.03 DESCRIPTION OF WORK

A. Provide factory assembled generator set equipment complete with digital electronic controls.

B. Provide factory test, equipment startup by a manufacturer-authorized technician, and on-site testing of the system.

C. The generator set manufacturer shall warrant all equipment provided under this section so that there is one source for warranty and product service. Technicians specifically trained and certified by the manufacturer to support the product and employed by the generator set supplier shall service the generator sets.

D. The engine generator set shall be EPA SI NSPS Compliant Capable. All field testing required to comply with all applicable provisions of EPA Title 40 requirements shall be performed by the engine generator set manufacturer. It shall be the responsibility of the engine generator manufacturer to obtain all required approvals.

1.04 RELATED WORK ELSEWHERE

A. For the purpose of obtaining a complete and integrated standby power system, the following sections shall be included under the scope of this section:
   1. Section 16495 – Transfer Switch.

B. The following sections include work which is related to the Standby Engine/Generator Set, but which is not included under the scope of this section:
   1. Division 15 – Mechanical.
   2. Division 16 – Electrical.

1.05 SHOP DRAWINGS

A. Submit shop drawings in accordance with Division 1.

B. General requirements specific to this section include:
   1. Submit complete and integrated document containing all equipment included under the scope of this section.
   2. Submittal shall be complete, neat, orderly, and indexed with tabbed dividers. Partial submittals are not acceptable.
   3. Clarity and completeness are of prime importance. Acceptability of submittal drawings shall be at the sole discretion of the Engineer in regards to this requirement.

C. Submit the following information:
   1. Manufacturer's product literature and performance data, sufficient to verify conformance with specification requirements.
   2. A paragraph-by-paragraph listing of exceptions to the specifications, describing the differences between the specified and the proposed equipment.
   3. Manufacturer certification of prototype testing.

4. Manufacturer published warranty documents.
5. Shop drawings showing plan and elevation views with certified overall dimensions and conduit connection details.
6. Interconnection wiring diagrams showing all external connections required, with field-wiring terminals marked in a consistent point-to-point manner.
7. Manufacturer published installation instructions.

1.06 FACTORY TESTING

A. The generator set supplier shall perform a complete operational test on the generator set prior to shipping from the factory. Provide a certified test report. Fully test equipment for function and performance at the factory.

B. Factory testing may be witnessed by the owner and consulting engineer. Costs for travel expenses will be the responsibility of the owner and consulting engineer. Supplier is responsible to provide two weeks notice for testing.

C. Perform generator set factory tests at rated load and rated power factor. Generator sets that have not been factory tested at rated power factor will not be acceptable. Tests shall include: run at full load, maximum power, voltage regulation, transient and steady state governing, single step load pickup, and function of safety shutdowns.

1.07 OPERATION & MAINTENANCE MANUALS AND INSTRUCTIONS

A. Submit Operation & Maintenance Manuals and Instructions in accordance with Division 1.

B. Submit final revised shop drawings incorporating any modifications made because of installation, start-up, operational testing, or for any other cause.

C. Submit results of all field-testing and corrective actions taken for all operational parameters.

D. Submit manufacturers standard operation & maintenance information including installation manuals and safety instructions.

E. Submit contact list identifying names, addresses, telephone numbers, and any additional contact information for each equipment service organization involved with the Standby Engine/Generator Set.

F. Submit detailed operation and maintenance procedures for each major equipment item; include description of operation for all modes of operation, routine maintenance procedures, and trouble-shooting guide.

G. Submit listing of spare parts provided under this contract and of recommended additional spare parts not provided under this contract along with costs.

1.08 QUALITY ASSURANCE

A. The generator set manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

B. All materials, equipment, and parts shall be new and unused of current manufacture.

C. System supplier shall be responsible for providing all necessary accessories required for a complete and operable system.

D. The Standby Engine/Generator Set manufacturer shall have been engaged in the manufacture of generator sets for a minimum of ten years and shall have a factory trained service and parts organization located within one hundred miles of the jobsite.

E. All control equipment shall be the standard product of the engine/generator set manufacturer. Controls systems supplied by a subcontractor of the manufacturer and not incorporated into the standard documentation of the manufacturer will not be acceptable.

1.09 WARRANTY

A. Warrant the generator set and associated equipment for a period of not less than five years from the date of commissioning against defects in materials and workmanship.

B. The warranty shall be comprehensive with no deductibles for travel time, service hours, repair parts cost, etc.

C. The manufacturer of the generator set shall maintain service parts inventory at a central location that is accessible to the service location twenty-four hours per day, three hundred sixty-five days per year.

D. A local service organization that is factory trained and certified in generator set service shall service the generator set. The service organization shall maintain an inventory of critical replacement parts. The service organization shall be on call twenty-four hours per day, three hundred sixty-five days per year.

E. The manufacturer shall maintain model and serial number records of each generator set provided for at least twenty years.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Acceptable Manufacturers
1. Cummins/Onan.
2. Kohler Power Systems.
3. Caterpillar/Olympian.

B. The first named manufacturer is the basis for these specifications, the installation design, the heating/ventilation design, and the fuel system design. If the contractor elects to supply equipment of another named manufacturer, then the contractor shall be responsible for adjusting the installation of the standby engine/generator set to satisfy the requirements of that manufacturer's equipment.

C. The Engineer will only consider equipment of manufacturers, other than those named, as an alternate in accordance with the requirements of Division 1. The following information shall be submitted prior to acceptance of alternate equipment:
1. Certified dimensional data.
2. Verification of adequate cooling/combustion air for the installation.
3. Complete interconnecting wiring and piping diagrams.
4. Manufacturer certification of prototype testing.

5. Load study/profile showing non-overloading of genset under steady-state conditions and during motor starting.
6. Manufacturer's product literature and performance data, sufficient to verify compliance to specification requirements.
7. A paragraph-by-paragraph listing of exceptions to the specifications, describing the differences between the specified and the proposed equipment.
8. Short circuit study of the load circuits to verify that selective coordination occurs and that thermal-magnetic stresses on components will not exceed the specified ratings.
9. Listing of similar projects and owner contact information for projects completed during the previous five years.

2.02 GENERATOR SET

A. Ratings
1. The generator set shall operate at 1800 rpm and at a voltage of: 277/480 VAC, three-phase, four-wire, 60Hz.
2. The generator set shall be rated at 300kW, 375 kVA at 0.8 PF, based upon an altitude of 1000 feet and an ambient temperature of 100 degrees F.
3. Base generator set ratings upon emergency/standby service.

B. Performance
1. Voltage regulation shall be +/-0.5 percent for any constant load between no load and rated load for both parallel and non-parallel applications. Random voltage variation with any steady load from no load to full load shall not exceed +/-0.5 percent.
2. Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed +/-0.25 percent.
3. The engine-generator set shall be capable of single step load pick up of 100 percent nameplate kW and power factor, less applicable derating factors, with the engine-generator set at operating temperature. Generator shall be capable of full-voltage starting and running one 30 hp vertical turbine well pump (started on adjustable frequency drive) and of operating other miscellaneous loads as identified on the drawings.
4. Motor starting capability shall be a minimum of 1210 kVA. The generator set shall be capable of sustaining a minimum of 90 percent of rated no load voltage with the specified kVA load at near zero power factor applied to the generator set.
5. The alternator shall produce a clean AC voltage waveform, with not more than 5 percent total harmonic distortion at full linear load, when measured from line to neutral, and with not more than 3 percent in any single harmonic. Telephone influence factor shall be less than 40.

C. Construction
1. Mount the engine-generator set on heavy-duty steel base and maintain alignment between components. The base shall incorporate a corrosion resistant battery tray with hold-down clamps within the rails.
2. All switches, lamps, and meters in the control system shall be oil-tight and dust-tight, and the enclosure door shall be gasketed. There shall be no exposed points in the control panel (with the door open) that operate in excess of 50 volts.

D. Connections

1. The generator set load connections shall be composed of silver or tin plated copper bus bars, drilled to accept mechanical or compression terminations for the number and type cables shown on the drawings. Provide suitable lugs and termination space for use with cables of the number and size as shown on the drawings.
2. Power connections to auxiliary devices shall be made at the devices, with required protection located at the power distribution panel as shown on the drawings.
3. Generator set control interfaces to other system components shall be made on a common, permanently labeled terminal block assembly.

2.03 ENGINE AND ENGINE EQUIPMENT

A. The engine shall be natural gas fueled, city water heat exchanger cooled. The horsepower rating of the engine at its minimum tolerance level shall be sufficient to drive the alternator and all connected accessories.

B. Accessories and features
1. Complete engine fuel system, including all pressure regulators, strainers, and control valves. Plumb the fuel system to the generator set skid for ease of site connections to the generator set.
2. An electronic governor system shall provide automatic isochronous frequency regulation. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The control system shall actively control the fuel rate and excitation as appropriate to the state of the generator set. Regulate fuel rate as a function of starting, accelerating to start disconnect speed, accelerating to rated speed, and operating in various isochronous or parallel states.
3. City Water Heat Exchanger cooling system rated for full load operation in 104 degrees F (40 degrees C) ambient as measured at the generator air inlet, based on 0.5 inch-H2O external static head. Size heat exchanger based on a city water temperature of 50 degrees F.
4. Electric starter(s) capable of three complete cranking cycles without overheating.
5. Positive displacement, mechanical, full pressure, lubrication oil pump.
6. Full flow lubrication oil filters with replaceable spin-on canister elements and dipstick oil level indicator.
7. Replaceable dry element air cleaner with restriction indicator.
8. Flexible fuel lines.
9. Engine mounted battery charging alternator, 40-ampere minimum, and solid-state voltage regulator.
10. Coolant heater
    a. Engine mounted, thermostatically controlled, coolant heater(s) for each engine. Heater voltage shall be as shown on the contract drawings. The coolant heater shall be UL499 listed and labeled.
    b. Connect the coolant heater to the engine with silicone hose connections. Use steel tubing for connections into the engine coolant system wherever the length of pipe exceeds 12 inches. Specifically design the coolant heater installation to provide proper venting of the system. Install coolant heater(s) using quick disconnect couplers to isolate the heater for replacement of the heater element. The quick disconnect/automatic sealing couplers shall allow replacement of the heater element without draining the engine cooling system or significant coolant loss.
    c. Provide a 24 VDC thermostat for the coolant heater and install at the engine thermostat housing. Factory wire the coolant heater system to an AC power connection box allowing for a single AC power connection.

d. Size the coolant heater(s) as recommended by the engine manufacturer to warm the engine to a minimum of 100 degrees F in a 40 degree F ambient, in compliance with NFPA110 requirements, or the temperature required for starting and load pickup requirements of this specification.

11. Provide vibration isolators, spring/pad type, quantity as recommended by the generator set manufacturer. Isolators shall include seismic restraints if required by site location.

12. Starting and Control Batteries shall be calcium/lead antimony type, 24 VDC, sized as recommended by the engine manufacturer, complete with battery cables and connectors.

2.04 AC GENERATOR

A. The AC generator shall be; synchronous, four pole, 2/3 pitch, revolving field, drip-proof construction, single pre-lubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc. All insulation system components shall meet NEMA MG1 temperature limits for Class H insulation system. Actual temperature rise measured by resistance method at full load shall not exceed 125 degrees C.

B. The generator shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5 percent above or below rated voltage.

C. A permanent magnet generator (PMG) shall be included to provide a reliable source of excitation power for optimum motor starting and short circuit performance. The PMG and controls shall be capable of sustaining and regulating current supplied to a single-phase or three-phase fault at approximately 300 percent of rated current for not more than 10 seconds.

D. The subtransient reactance of the alternator shall not exceed 12 percent, based on the standby rating of the generator set.

2.05 ENGINE GENERATOR SET CONTROL

A. Provide a microprocessor-based control system designed to provide automatic starting, monitoring, and control functions for the generator set. Design the control system to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification. Mount the control on the generator set. The control shall be vibration isolated and prototype tested to verify the durability of all components in the system under the vibration conditions encountered.

B. The generator set mounted control shall include the following features and functions:

1. Control Switches
   a. Mode Select Switch: The mode select switch shall initiate the following control modes. When in the RUN position the generator set shall start, and accelerate to rated speed and voltage. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position, the generator set shall accept a signal from a remote device to start and accelerate to rated speed and voltage.
   b. EMERGENCY STOP switch: Switch shall be red "mushroom-head" push-button. Depressing the emergency stop switch shall immediately shut down the generator set, and prevent automatic restarting.
   c. RESET switch: The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.
   d. PANEL LAMP switch: The panel lamp switch shall illuminate all panel for ten minutes or until the switch is depressed a second time.
2. Generator Set AC Output Metering

a. Analog voltmeter, ammeter, frequency meter, and kilowatt (KW) meter. Voltmeter and ammeter shall display all three phases. Ammeter and kW meter scales shall be color coded in the following fashion: readings from 0-90 percent of generator set standby rating: green; readings from 90-100 percent of standby rating: amber; readings in excess of 100 percent: red.

b. Digital metering set, 0.5 percent accuracy, to indicate generator RMS voltage and current, frequency, output current, output kW, kWh, and power factor. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all three-phase voltages (line to neutral or line to line) simultaneously.

c. Both analog and digital metering are required. A single microprocessor shall drive the analog and digital metering equipment to provide consistent readings and performance.

3. Generator Set Alarm and Status Display

a. Provide alarm and status indicating lamps to indicate non-automatic generator status, warning, and shutdown conditions. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. The generator set control shall indicate the existence of the following alarm and shutdown conditions on an alphanumeric digital display panel:

1) Low oil pressure (alarm).
2) Low oil pressure (shutdown).
3) Oil pressure sender failure (alarm).
4) Low coolant temperature (alarm).
5) High coolant temperature (alarm).
6) High coolant temperature (shutdown).
7) Engine temperature sender failure (alarm).
8) Low coolant level (alarm or shutdown-selectable).
9) Fail to crank (shutdown).
10) Fail to start/overcrank (shutdown).
11) Over speed (shutdown).
12) Low DC voltage (alarm).
13) High DC voltage (alarm).
14) Weak battery (alarm).
15) Low fuel (alarm).
16) High AC voltage (shutdown).
17) Low AC voltage (shutdown).
18) Under frequency (shutdown).
19) Over current (warning).
20) Over current (shutdown).
21) Short circuit (shutdown).
22) Over load (alarm).
23) Emergency stop (shutdown).
24) Make provisions for indication of four customer-specified alarm or shutdown conditions. Labeling of the customer-specified alarm or shutdown conditions shall be of the same type and quality as the above-specified conditions.
25) The non-automatic indicating lamp shall be red, and shall flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.

4. Engine Status Monitoring

a. The following information shall be available from a digital status panel on the generator set control:

1) Engine oil pressure (PSI or kPA).
2) Engine coolant temperature (degrees F or C).
3) Engine oil temperature (degrees F or C).
4) Engine speed (rpm).
5) Number of hours of operation (hours).
6) Number of start attempts.
7) Battery voltage (DC volts).
8) The control system shall also incorporate a data logging and display provision to allow logging of the last 10 warning or shutdown indications on the generator set, as well as total time of operation at various loads, as a percent of the standby rating of the generator set.

5. Engine Control Functions
   a. The control system provided shall include a cycle cranking system, which allows for user selected crank time, rest time, and number of cycles. Initial settings shall be for three cranking periods of 15 seconds each, with 15 second rest period between cranking periods.
   b. The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. Disable the alternator excitation system in this mode.
   c. The control system shall include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting.
   d. The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.
   e. The control system shall include sender failure monitoring logic for speed sensing, oil pressure, and engine temperature that is capable of discriminating between failed sender or wiring components, and actual failure conditions.
6. Alternator Control Functions
   a. The generator set shall include an automatic digital voltage regulation system matched and prototype tested with the governing system provided. It shall be immune from failure due to load-induced voltage waveform distortion and shall provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below a threshold of 58-59 HZ. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range, and made via digital raise-lower switches, with an alphanumeric LED readout to indicate setting level. Rotary potentiometers for system adjustments are not acceptable.
   b. Monitor the output current of the generator set and initiate an alarm (over current warning) when load current exceeds 110 percent of the rated current of the generator set on any phase for more than 60 seconds. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator. The protective functions provided shall comply with the requirements of NFPA70 article 445.

c. Individually monitor all three phases of the output current for short circuit conditions. The control/protection system shall monitor the current level and voltage. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (short circuit shutdown). The protective functions provided shall comply with the requirements of NFPA70 article 445.

d. Monitor the kW load on the generator set, and initiate an alarm condition (over load) when total load on the generator set exceeds the generator set rating for in excess of 5 seconds. Controls shall include a set of dry contacts for load-shed control.

e. Provide an AC over/under voltage monitoring system that responds only to true RMS voltage conditions. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110 percent of the operator-set voltage level for more than 10 seconds or with no intentional delay when voltage exceeds 130 percent. Under voltage shutdown shall occur when the output voltage of the alternator is less than 85 percent for more than 10 seconds.

f. A battery monitoring system shall be provided which initiates alarms when the DC control and starting voltage is less than 25 VDC or more than 32 VDC. Disable the low voltage limit during engine starting. If DC voltage drops to less than 14.4 volts for more than two seconds, initiate "weak battery" alarm.

7. Control Interfaces for Remote Monitoring

a. Terminate all generator set control and interconnection points to remote components in a separate connection box. Do not make field connections in the control enclosure or in the AC power output enclosure.

b. Form "C" dry common alarm contact set rated 2A/30VDC to indicate existence of any alarm or shutdown condition on the generator set.

c. One set of contacts rated 2A/30VDC to indicate generator set is ready to load. The contacts shall operate when voltage and frequency are greater than 90 percent of rated condition.

d. Provide a fused, switched 10A/24VDC power supply circuit for customer use. DC power shall be available from this circuit whenever the generator set is running.

e. Provide a fused 20A/24VDC power supply circuit for customer use. DC power shall be available from this circuit at all times from the engine starting/control batteries.

f. Provide conduit and wiring from SCADA PNL 7275 to PNL 7276.

8. Provide a mounted main line circuit breaker, sized to carry the rated output current of the generator set on a continuous basis. The circuit breaker shall incorporate an electronic trip unit that operates to protect the alternator under all over current conditions, or a thermal-magnetic trip with other over current protection devices that positively protect the alternator under over current conditions. The supplier shall submit time over current characteristic curves and thermal damage curve for the alternator, demonstrating the effectiveness of the protection provided.

C. Sequence of Operation

1. Generator set shall start on receipt of a start signal from remote equipment. The start signal shall be via hardwired connection to the generator set.
2. The generator set shall complete a time delay start period as programmed into the control.
3. The generator set control shall initiate the starting sequence for the generator set.

a. The control system shall verify that the engine is rotating when the starter is signaled to operate. If the engine does not rotate after two attempts, the control system shall shut down and lock out the generator set, and indicate "fail to crank" shutdown.

b. The engine shall fire and accelerate as quickly as practical to start disconnect speed. If the engine does not start, it shall complete a cycle cranking process as described elsewhere in this specification. If the engine has not started by the completion of the cycle cranking sequence, it shall be shut down and locked out, and the control system shall indicate "fail to start".

c. The engine shall accelerate to rated speed and the alternator to rated voltage. Excitation shall be disabled until the engine has exceeded programmed idle speed, and regulated to prevent over voltage conditions and oscillation as the engine accelerates and the alternator builds to rated voltage.

4. On reaching rated speed and voltage, the generator set shall operate as dictated by the control system in isochronous, synchronize, load share, load demand, or load govern state.

5. When all start signals have been removed from the generator set, it shall complete a time delay stop sequence. The duration of the time delay stop period shall be adjustable by the operator.

6. On completion of the time delay stop period, the generator set control shall switch off the excitation system and shall shut down. Any start signal received after the time stop sequence has begun shall immediately terminate the stopping sequence and return the generator set to isochronous operation.

2.06 ENGINE EXHAUST SYSTEM

A. Provide catalytic converter for each engine of size and type as recommended by the generator set manufacturer and approved by the engine manufacturer. Install exhaust system according to the engine manufacturer's recommendations and applicable codes and standards.

B. Provide exhaust silencer(s) for each engine of size and type as recommended by the generator set manufacturer and approved by the engine manufacturer. The mufflers shall be critical grade. Install exhaust system according to the engine manufacturer's recommendations and applicable codes and standards.

C. Provide stainless steel, seamless flexible exhaust manifold connector.

D. Insulate silencer and exhaust piping with rigid insulation, rated for the engine exhaust temperature, to maintain a surface temperature of not more than 150 degrees F. Provide 0.016-inch aluminum jacket complete with crimped end covers, secured with stainless steel sheet metal screws and rubber coated washers. Insulation system shall not interfere with flexible fittings.

E. Provide exhaust thimble(s) for exhaust penetration of exterior building walls. Construction shall be fireproof.

2.07 NATURAL GAS ENGINE FUEL SYSTEM

A. The mechanical contractor shall provide fuel-piping system.

B. Provide appropriately sized fuel regulator.

C. Engine fuel consumption shall not exceed 4200 cfh at a pressure of 10-20 inches of water column. Minimum fuel pipe size of 2-inch.

2.08 ACCESSORIES

A. Provide supply of consumables (air cleaner, oil filter, etc) in sufficient quantity to last for one year from the date of substantial completion.

PART 3 - CONSTRUCTION METHODS

3.01 DIVISION OF WORK

A. The Contractor shall have overall system responsibility and shall provide all materials and labor necessary provide a complete and operable system and comply with all requirements of this section.

B. The engine/generator set manufacturer shall be responsible for certifying the correctness of installation for all work related to the standby power system regardless of who performs the installation work.

C. The contract drawings are diagrammatic in nature; it shall be the responsibility of the manufacturer to supplement the contract drawings and complete the final design of the standby power system and to coordinate exact requirements with the installing contractors.

3.02 FIELD MEASUREMENTS

A. Field verify, with exact measurements, the available mounting space for standby power system equipment. Identify deficiencies prior to beginning installation.

3.03 DELIVERY STORAGE AND HANDLING

A. It shall be the responsibility of the installing contractor to receive all standby power system equipment at the job site. Carefully inspect all equipment for damage prior to accepting from the shipping agency. Do not accept shipment if damage is evident.

B. Exercise due diligence in storing, protecting, and moving standby power system equipment. Damaged or worn equipment will not be accepted and will be replaced at no additional cost to the Owner.

3.04 INSTALLATION

A. Install equipment in locations as indicated on the contract documents. Adjust locations as needed to ensure operability, serviceability, and compliance with all applicable codes and standards.

B. Completely test installation prior to start-up. This work includes verification of all field wiring continuity and proper termination of wiring.

C. The contractor shall install equipment in accordance with final submittals and contract documents. Installation shall comply with applicable state and local codes as required by the authority having jurisdiction. Install equipment in accordance with manufacturer's instructions and instructions included in the listing or labeling of UL listed products.

D. Installation of equipment shall include furnishing and installing all interconnecting wiring between all major equipment provided for the onsite power system. The contractor shall also perform interconnecting wiring between equipment sections (when required), under the supervision of the equipment supplier.

E. Install equipment on concrete housekeeping pads. Permanently fasten equipment to the pad in accordance with manufacturer's instructions and seismic requirements of the site.

F. Representatives of the manufacturer shall be initially start and operate equipment.

G. Physically inspect all equipment for damage. Repair scratches and other installation damage prior to final system testing. Thoroughly clean equipment and remove all dirt and construction debris prior to final testing of the system.

3.05 TESTING AND START-UP SERVICES

A. Standby power system supplier shall provide installation and start-up services required to place the complete system into operation.

B. Perform field testing of engine exhaust system for compliance with EPA Title 40 emissions regulations.

C. Test the complete installation for compliance with the specifications following completion of all site work. Representatives of the manufacturer shall conduct testing, with required fuel supplied by Contractor. Notify the Engineer in advance of the tests to allow the option of witnessed tests.

D. Installation acceptance tests to be conducted onsite shall include a "cold start" test, a two-hour full load test, and a one step rated load pickup test in accordance with NFPA 110. Provide a resistive load bank and make temporary connections for full load test. Provide all required cables and make accommodations for routing of cables to allow load bank to be located outside of the building.

E. Perform a power failure test on the entire installed system. Conduct test by opening the power supply from the utility service, and observing proper operation of the system for at least 2 hours. Coordinate timing and obtain approval for start of test with site personnel.

F. Test alarm and shutdown circuits by simulating conditions.

G. Adjust output voltage and engine speed.

H. Record kW, Amps, Volts, Frequency, oil pressure, coolant temperature, and room temperature at twenty-minute intervals during the test and report findings to Engineer in writing.

I. Verify operation of room ventilation system including interlocks with generator equipment.

J. Verify fuel system installation and capacity.

K. Provide for one technician followup visit within one month of commissioning for the purpose of consulting with the Owner and making any final adjustments, corrections, and repairs

3.06 TRAINING

A. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of the equipment provided. The training program shall be not less than 4 hours in duration and the class size shall be limited to five persons. Training date shall be coordinated with the facility owner.

B. Describe the loads connected to the standby power system along with restrictions for future use. Coordinate this discussion with the process instrumentation control system integrator and include automatic step start control and load control.

C. Identify record-keeping and reporting requirements for EPA Title 40 Emissions regulations.

- END OF SECTION -

SECTION 16900

PROCESS INSTRUMENTATION & CONTROL

PART 1 - GENERAL

1.01 APPLICABLE PROVISIONS

A. Applicable provisions of General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.

1. American National Standards Institute/Instrument Society of America (ANSI/ISA), Specifications and Standards, current edition:
   a. ANSI/ISA-5.1-1984 - Instrumentation Symbols and Identification .
   b. ANSI/ISA-5.3-1983 - Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic, and Computer Systems.
   c. ANSI/ISA-95.00.01-2000 - Enterprise Control System Integration, Part 1: Models and Terminology.
   d. ANSI/ISA-TR99.00.01-2004, Security Technologies for Manufacturing and Control Systems.
   e. ANSI/ISA-TR99.00.02-2004, Integrating Electronic Security into the Manufacturing and Control Systems Environment.
2. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
   a. NFPA 70 - National Electrical Code.
3. CE - European Community, Applicable Directives.
   a. EN50005 - for Terminal Markings.
   b. EN50081-1- Generic Emission Standard.
   c. EN50082-1 - Generic Immunity Standard.
   d. EN61000-4-4 - Electromagnetic compatibility (EMC). Testing and measurement techniques.
   e. EN61000-4-5 - Electromagnetic compatibility (EMC). Testing and measurement techniques. Surge immunity test.
4. Canadian Standards Association (CSA), Specifications and Standards, current edition:
   a. CSA C22.2, Industrial Control Equipment.
5. CUL - Underwriter's Laboratories of Canada.
6. International Electrotechnical Commission (IEC), Specifications and Standards, current edition:
   a. IEC 60529 - Classification of Degrees of Protection Provided by Enclosures
7. National Electrical Manufacturers Association (NEMA), Specifications and Standards, current edition:
   a. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
   b. NEMA ICS 3 - Industrial Control and Systems: Medium Voltage Controllers Rated 2001 to 7200 Volts AC.
8. Underwriters Laboratories, Inc. (UL), Specifications and Standards, current edition:
   a. UL508 - Industrial Control Equipment.

b. UL508A - Industrial Control Panels.
c. UL 913 - Intrinsically Safe Specification.
d. UL94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

1.03 DESCRIPTION OF WORK

A. For the purpose of obtaining a complete and integrated Process Instrumentation and Control System, the following sections shall be included under the scope of this section:
1. Section 16480 - Motor Control Centers
2. Section 16481 - Adjustable Frequency Motor Controllers
3. Section 16482 - Motor Controllers
4. Section 16910 - Control Panel Construction
5. Section 16911 - Control Panel Components
6. Section 16920 - Instrumentation Devices
7. Section 16960 - Ethernet Networking Equipment

B. The work specified herein shall include the furnishing of all materials, equipment, labor, and supervision necessary to fabricate, install, start-up, and test a complete and operable Process Instrumentation and Control System.

C. The labor specified herein includes but is not limited to engineering, software development, panel fabrication, equipment calibration and adjustment, testing, training, and documentation.

D. This section identifies the overall functional requirements for the Process Instrumentation and Control System.

E. This section includes coordination with the work of other sections. This work includes identification of exact interface requirements with motors, control panels, and field instrumentation provided under other portions of this specification. It shall be the responsibility of the system integrator specified under this section to execute this coordination during the shop drawing submittal phase of the work. Additional costs due to inadequate coordination as required herein shall be borne solely by this contractor.

F. This section includes coordination with electrical contractor to ensure that the proper number of raceways and conductors are installed. It shall be the responsibility of the system integrator to coordinate this work with the installing electrician. Additional costs due to inadequate coordination as required herein shall be borne solely by this contractor.

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300.

B. Submit the following information specifically for process instrumentation & control system:
1. General requirements specific to this section include:
a. Submit complete and integrated document containing all equipment included under the scope of this section.
b. Submittal shall be complete, neat, orderly, and indexed with tabbed dividers. Partial submittals will not be accepted.

c. Include a complete list of proposed exceptions to and deviations from these specifications.
d. Clarity and completeness are of prime importance. Acceptability of submittal drawings shall be at the sole discretion of the Engineer in regards to this requirement.
e. Additional requirements for the various subsystems are specified in the corresponding sections.

2. Submit the following information:
   a. Bill of Materials:
      1) Complete listing of all components identifying exact make and model, quantity, and description.
   b. Component Data Sheets:
      1) Detailed listing for each type of device, identifying Engineer's tag number, manufacturer, model, options, ranges, and other information necessary to supplement component catalog cut sheets and clearly show compliance with these specifications.
   c. Component Catalog Cut sheets:
      1) Manufacturer's standard catalog information.
   d. Control Panel Construction Drawings:
      1) Scaled drawings of all control panels and enclosures.
      2) Front panel elevation complete with nameplate legend.
      3) Back panel elevation complete with schedule of devices.
   e. Control Panel Schematic Wiring Diagrams:
      1) Ladder type schematic diagrams.
      2) Show all devices requiring electrical connections.
      3) Identify all wire and terminal numbers.
      4) Identify PLC I/O addresses.
      5) Reference Engineer's tag number where assigned.
      6) Cross-reference all relay contacts and coils.
      7) Identify switching action on all switching devices.
      8) Common diagrams will not be accepted.
   f. Analog Loop Diagrams:
      1) Show all devices requiring electrical connections.
      2) Identify all wire and terminal numbers.
      3) Identify PLC I/O addresses.
      4) Identify location of loop power supply.
      5) Identify field devices, back-of-panel devices, and front-of panel devices.
      6) Show tabular summary of transmitter output capability, input impedance of each receiver, total loop impedance, and reserve output capacity.
      7) Reference Engineer's tag number where assigned.
      8) Common diagrams will not be accepted.
   g. Control Panel Plumbing Diagrams:
      1) Show all devices requiring plumbing connections (air or liquid).
      2) Show pipe/tube sizing.
      3) Show all control devices (valves, regulators, filters, etc.).
   h. Control Panel Power and Environmental Requirements:

1) Identify voltage and ampacity requirements.
2) Show sizing calculations for environmental controls (ventilation, heat, air conditioning).

i. Interconnecting Wiring Diagrams:
1) Show all interconnections between control panels.
2) Show all interconnections between control panels and motor control centers.
3) Show all interconnections between control panels and field devices.
4) Show all interconnections between motor control centers and field devices.
5) Identify all wire and terminal numbers, including field terminal junction box terminals.

j. Control Device Installation Details:
1) Supplement contract documents with additional details necessary for proper installation of control devices.

k. Configuration Documentation:
1) Submit complete, documented configuration data for all configurable controllers.
2) Additional requirements for PLC systems and PC based SCADA systems are identified in the individual subsystem sections.

1.05 FACTORY TESTING

A. The entire Process Instrumentation and Control System shall be assembled at the manufacturer's facility and tested to the greatest extent possible. This test shall include simulation of all I/O points and demonstration of proper system operation. Document the results of this test in writing and submit to the Engineer.

B. The Engineer and Owner may witness the factory acceptance test. Schedule test date a minimum of two weeks in advance to allow attendance by the Engineer and the Owner.

C. Correct any deficiencies identified during the test prior to shipping the control system to the job site.

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS

A. Submit operation & maintenance manuals and instructions in accordance with Division 01.

B. Submit the following information specifically for hardware alarm notification system:
1. Submit final revised shop drawings incorporating any modifications made as a result of factory test, installation, start-up, operational testing, or for any other cause. Submit results of all field-testing and corrective actions taken for all discrete control devices and for all analog control devices. Submit analog device calibration data sheets.
2. Submit manufacturers standard operation & maintenance information including installation manuals and safety instructions.
3. Submit contact list identifying names, addresses, telephone numbers, and any additional contact information for each equipment service organization involved with the Process Instrumentation and Control System.

4. Submit detailed operation and maintenance procedures for each major equipment item; include description of operation for all modes of operation, routine maintenance procedures, and trouble-shooting guide.
5. Submit listing spare parts provided under this contract and of recommended additional spare parts not provided under this contract along with costs.

1.07 QUALITY ASSURANCE

A. All materials, equipment, and parts shall be new and unused of current manufacture.

B. System supplier shall be responsible for providing all necessary accessories required for a complete and operable system.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

D. Products: Listed and classified by UL or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.08 WARRANTY

A. See Division 01 for additional requirements.

PART 2 - PRODUCTS

2.01 SYSTEM INTEGRATOR

A. The system integrator shall be a firm specializing in the integration of control systems with documented experience in the detailed design, construction, configuration, and maintenance of PLC based control systems and motor control centers for the water/wastewater utility market. This experience must include a minimum of five projects similar in nature to this project during the last five years.

2.02 GENERAL FUNCTIONAL DESCRIPTION

A. Summary of System Improvements:
1. Install new motor control center which shall consist of a complete motor control system as identified on the drawings and as specified herein.
2. Provide field instrumentation devices as specified in Section 16920.
3. Provide terminal junction box with terminations for all instrumentation & control wiring as indicated on the drawings.

2.03 FUNCTIONAL REQUIREMENTS

A. Pump Control
1. Local Control Functions:
   a. Utilize high temperature sensing at pump motor, provided under Division 11, to detect abnormal motor conditions.
2. Motor Controller Functions:

a. MCC HAND-OFF-AUTO selector switch shall control motor operation. In HAND position, the motor shall run continuously at the speed set on the AFD keypad. In OFF position, the motor shall not run. In AUTO position, the motor shall start and stop in response to the REQUIRED and SPEED COMMAND signals provided by others.

b. Adjustable START delay shall be activated when the motor is called to run in HAND or in AUTO. Pump shall start after the time delay has elapsed.

c. MOTOR HIGH TEMPERATURE condition shall activate corresponding MCC pilot light and shall prevent motor from further operation until reset.

d. Provide auxiliary contacts to allow monitoring of the following conditions: MOTOR HIGH TEMPERATURE, IN AUTO, RUN, and AFD FAULT conditions.

e. RUN condition shall activate corresponding MCC pilot light and RUNTIME TOTALIZER.

B. HVAC System Control

1. Provide control of Chemical Room HVAC system as shown on the drawings. PLC system shall call for HVAC system to operate based upon adjustable interval and duration timers or whenever the space is occupied, as detected by door switch. Room low temperature condition shall prevent operation of HVAC based on interval and duration timers but shall not affect operation when room is occupied.

2. Provide control of Pump Room HVAC system as shown on the drawings. PLC system shall call for HVAC system to operate based upon adjustable interval and duration timers. Room low temperature condition shall prevent operation of HVAC based on interval and duration timers.

PART 3 - CONSTRUCTION METHODS

3.01 FIELD MEASUREMENTS

A. Field verify with exact measurements, the available mounting space for control system equipment. Identify deficiencies prior to beginning installation.

B. Where ranges are indicated on the contract documents, they are to be considered preliminary. Field verify the exact ranges required based on field conditions.

3.02 DELIVERY STORAGE AND HANDLING

A. It shall be the responsibility of the installing contractor to receive all process instrumentation and control equipment at the job site. Carefully inspect all equipment for damage prior to accepting from the shipping agency. Do not accept shipment if damage is evident.

B. Exercise due diligence in storing, protecting, and moving process instrumentation and control equipment. Damaged or worn equipment will not be accepted and will be replaced at no additional cost to the Owner.

3.03 INSTALLATION

A. Install equipment in locations as indicated on the contract documents. Adjust locations as needed to ensure operability, serviceability, and compliance with all applicable codes and standards.

B. Installation shall be completely tested prior to start-up. This work includes verification of all field wiring continuity and proper termination of wiring.

3.04 TESTING AND START-UP SERVICES

A. System Integrator shall provide installation and start-up services required to place the complete system into operation.

B. Each signal and function shall be fully tested. These tests shall be based on actual operation of primary elements and verification of proper control system response. Submit test results as part of Operations and Maintenance Manual.

C. Record calibrations of all analog devices.

D. Demonstrate proper operation of the process and instrumentation control system to the Owner and in the presence of the Engineer.

3.05 TRAINING

A. Training shall be suitable for plant operations personnel with limited knowledge of electrical components.

B. Provide two instructor days of operator training at the job site. Training shall consist of operations instruction and maintenance/trouble-shooting instruction.
   1. Operations instruction shall identify all control loops with description of all interlocks, interface with other loops, and operational input requirements. Describe procedures for re-starting the system.
   2. Maintenance instruction shall identify periodic maintenance that can be performed by the operator. Provide description of procedures and locations for replacement of consumable devices such as fuses and for checking the calibration or operation of devices.
   3. Trouble-shooting instruction shall identify simple procedures and methods for identifying potential causes in the event of failures. For example, instruct operator on correlation of input signals and PLC I/O module indicator lights.

END OF SECTION

SECTION 16910

CONTROL PANEL CONSTRUCTION

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.
   1. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards:
      a. ANSI/NFPA 70 - National Electrical Code and state amendments thereto.
      b. ANSI/NFPA 79 - Electrical Standard for Industrial Machinery.
   2. American National Standards Institute/Instrument Society of America (ANSI/ISA), Specifications and Standards, current edition.
   3. Canadian Standards Associates (CSA), Specifications and Standards, Current Edition.
      a. CSA Standard C22.2 No. 0 - General Requirements - Canadian Electrical Code, Part II
      b. CSA Standard C22.2 No. 0.4 - Bonding and Grounding of Electrical Equipment (Protective Equipment)
      c. CSA Standard C22.2 No. 14 - Industrial Control Equipment for Use in Ordinary (Non-Hazardous) Locations
      d. CSA Standard C22.2 No. 40 - Cutout, Junction, and Pull boxes
      e. CSA Standard C22.2 No. 94 - Special Purpose Enclosures
   4. Electrical and Electronic Manufacturers Association Canada (EEMAC), Specifications and Standards, Current Edition.
   5. International Electrotechnical Association (IEC), Specifications and Standards, Current Edition.
      a. IEC 60529 - Classification of Degrees of Protection Provided by Enclosures
      b. IEC 60204 - Safety of Machinery - Electrical Equipment of Machines
      c. IEC 60079 - Electrical Apparatus for Explosive Gas Atmospheres
   6. National Electrical Manufacturers Association (NEMA), Specifications and Standards, Current Edition.
      a. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum)
      b. NEMA ICS6 - Enclosures for Industrial Controls and Systems
   7. Underwriters Laboratories, Inc. (UL), Specifications and Standards, Current Edition.
      a. UL50 - Cabinets and Boxes
      b. UL508 - Industrial Control Equipment
      c. UL508A - Industrial Control Panels
      d. UL94 - Flammability of Plastic Materials

1.03 DESCRIPTION OF WORK

A. For the purpose of obtaining a complete and integrated process instrumentation and control system, the work specified herein shall be included under the scope of:

1. Section 26 90 00 - Process Instrumentation & Control

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300.

B. Submit shop drawings for the equipment specified herein as part of the complete, integrated submittal for the process instrumentation & control system and in accordance with the requirements specified under Section 16900 - Process Instrumentation & Control.

1.05 FACTORY TESTING

A. Refer to the requirements of Section 16900 - Process Instrumentation & Control.

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS

A. Submit operation & maintenance manuals and instructions in accordance with Section 01300.

B. Submit operation and maintenance manuals for the equipment specified herein as part of the complete, integrated manual for the process instrumentation and control system and in accordance with the requirements specified under 16900 - Process Instrumentation & Control.

1.07 QUALITY ASSURANCE

A. All materials, equipment, and parts shall be new and unused of current manufacture.

B. System supplier shall be responsible for providing all necessary accessories required for a complete and operable system.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

D. All control panels shall be constructed in accordance with UL 508 standards and shall bear the UL 508 listing.

1.08 EXTRA MATERIALS

A. Provide one spare vapor phase corrosion inhibiting capsule for each control panel.

B. Provide a ten or twenty percent of the total number of terminals as installed spares in each control panel.

1.09 DESIGN REQUIREMENTS

CONTROL PANEL CONSTRUCTION REQUIREMENTS					
TAG NUMBER	DESCRIPTION	TYPE	SIZE	UPS	NOTES
TJB	Terminal Junction Box	A	24"Wx24"Hx12"D		

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Fabricate, install instruments, plumb and wire in factory.

B. Test wiring and plumbing prior to shipment.

C. Make external connections by way of numbered terminal blocks.

D. Separate electrical components from pneumatic and hydraulic components by metal barriers.

E. Conform to ISA standards.

2.02 TYPE A - CONTROL PANEL ENCLOSURE, WALL-MOUNTED

A. Manufacturer:
   1. Hoffman Enclosures, Inc. Concept Wall-Mount Enclosure
   2. or equal

B. Environmental Rating:
   1. NEMA Type 4/12

C. Construction:
   1. 16 gauge or 14 gauge steel
   2. Seams continuously welded and ground smooth
   3. Minimum width body flange trough excludes liquids and contaminants
   4. Integral body grounding stud
   5. Panel mounting studs
   6. Mounting holes in back of body for direct mounting
   7. Hidden hinges for clean aesthetic appearance
   8. Standard full access 170 degree door opening
   9. Doors are interchangeable and easily removable by pulling captive hinge pins
   10. Door bar on hinge side for wire management and grounding
   11. Additional door bar and stiffener on larger enclosures for extra rigidity
   12. High-impact thermoplastic data pocket
   13. Seamless foam-in-place one-piece gasket provides oil-tight and dust-tight seal against contaminants
   14. Self-grounding latch system with double seal provides maximum protection against leakage
   15. Quarter-turn door latching system installed on door with a slotted insert
   16. Finish:
      a. Gray or textured light gray polyester powder coated inside and out
      b. Steel sub-panels are painted white

PART 3 - EXECUTION

3.01 FIELD MEASUREMENTS

A. Refer to the requirements of Section 16900 - Process Instrumentation & Control.

3.02 DELIVERY STORAGE AND HANDLING

A. Refer to the requirements of Section 16900 - Process Instrumentation & Control.

3.03 INSTALLATION

A. Refer to the requirements of Section 16900 - Process Instrumentation & Control.

3.04 CONTROL PANEL ELECTRICAL REQUIREMENTS

A. Control Panel Wiring:
   1. Wiring within panels, consoles, racks, and cabinets shall meet the following requirements:
      a. Wires for ac circuits shall be 300V or 600V, Type MTW stranded copper and shall be sized for the current to be carried but not smaller than No.16 AWG.
      b. Wires for analog signal circuits shall be 300V stranded copper and shall be twisted shielded pairs not smaller than No.18 AWG.
      c. Wires for other dc circuits shall be 300V, Type MTW stranded copper not smaller than No.18 AWG.
      d. Wiring for special signals such as communications, digital data, and multiplexed signals shall use manufacturers standard cables.
   2. Terminal blocks for panels, consoles, racks, and cabinets shall meet the following requirements:
      a. Wire all spare or unused panel mounted elements, including PLC input/output points, to terminal blocks.
      b. Provide open construction terminal blocks for wiring that is entirely internal to the panel.
      c. Provide isolation switch terminal blocks for all wiring that is not entirely internal to the panel.
      d. Rail-mount individual terminals to create a complete assembly. Provide terminals constructed such that jumpers can be installed with no loss of space on terminal or rail.
      e. Size all terminal block components to allow insertion of all necessary wire sizes and types.
      f. Provide power distribution blocks for distribution of control panel power at voltages exceeding 120VAC.
   3. Grounding:
      a. Panels, consoles, racks, and cabinets shall be provided with an isolated copper grounding bus for all signal and shield ground connections. This ground bus shall be grounded at a common single ground point. The signal grounding system shall meet National Electrical Code requirements.
      b. Each analog loop shall only be grounded at a single point for the loop. This single point shall be at the location of the dc power supply for the loop.

3.05 STANDARD SIGNAL INTERFACES

A. Unless otherwise specified discrete input and output signals shall conform to the following:
   1. Isolated unpowered (dry) contact closures.
   2. Power contact from panel receiving signal or device receiving signal.

B. Unless otherwise specified input and output analog signals shall conform to following:
   1. External to panel: isolated, 4-20 mADC.
   2. Internal to panel: 1 to 5VDC signals.
   3. For 2-wire transmitter provide isolated type and power with 24VDC from panel or device receiving signal.
   4. Where isolation is required to interface with particular equipment or because of loop impedance, provide isoloated, DC-to-DC transmitter.

3.06 TESTING AND START-UP SERVICES

A. Refer to the requirements of Section 16900 - Process Instrumentation & Control.

3.07 TRAINING

A. Refer to the requirements of Section 16900 - Process Instrumentation & Control.

END OF SECTION

SECTION 16911

CONTROL PANEL COMPONENTS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.

1. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
   a. ANSI/NFPA 70 - National Electrical Code and state amendments thereto.
   b. ANSI/IEEE C37.90 - IEEE Standard for Relays and Relay Systems Associated with Electric Power Apparatus.
   c. ANSI/IEEE C62.11- IEEE Standard for Metal-Oxide Surge Arresters for Alternating Current Power Circuits.
   d. ANSI/IEEE C62.34 - IEEE Standard for Performance of Low-Voltage Surge-Protective Devices (Secondary Arresters).
   e. ANSI/IEEE C62.41 - IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
2. CE - European Community, Applicable Directives.
   a. EN50005 - for Terminal Markings.
   b. EN50081-1- Generic Emission Standard.
   c. EN50082-1 - Generic Immunity Standard.
   d. EN61000-4-4 - Electromagnetic compatibility (EMC). Testing and measurement techniques.
   e. EN61000-4-5 - Electromagnetic compatibility (EMC). Testing and measurement techniques. Surge immunity test.
3. Canadian Standards Association (CSA), Specifications and Standards, current edition:
   a. CSA C22.2, Industrial Control Equipment.
4. CUL - Underwriter's Laboratories of Canada.
5. International Electrotechnical Commission (IEC), Specifications and Standards, current edition:
   a. IEC 60529 - Classification of Degrees of Protection Provided by Enclosures
6. National Electrical Manufacturers Association (NEMA), Specifications and Standards, current edition:
   a. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
   b. NEMA ICS 3 - Industrial Control and Systems: Medium Voltage Controllers Rated 2001 to 7200 Volts AC.
7. Underwriters Laboratories, Inc. (UL), Specifications and Standards, current edition:
   a. UL508 - Industrial Control Equipment.
   b. UL508A - Industrial Control Panels.
   c. UL 913 - Intrinsically Safe Specification.

d. UL94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

1.03 DESCRIPTION OF WORK

A. For the purpose of obtaining a complete and integrated process instrumentation and control system, the work specified herein shall be included under the scope of:
1. Section 16900 - Process Instrumentation & Control

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300.

B. Submit shop drawings for the equipment specified herein as part of the complete, integrated submittal for the process instrumentation & control system and in accordance with the requirements specified under Section 16900 - Process Instrumentation & Control.

1.05 FACTORY TESTING

A. Refer to the requirements of Section 16900 - Process Instrumentation & Control.

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS

A. Submit operation & maintenance manuals and instructions in accordance with Section 01300.

B. Submit operation and maintenance manuals for the equipment specified herein as part of the complete, integrated manual for the process instrumentation and control system and in accordance with the requirements specified under 16900 - Process Instrumentation & Control.

1.07 QUALITY ASSURANCE

A. All materials, equipment, and parts shall be new and unused of current manufacture.

B. System supplier shall be responsible for providing all necessary accessories required for a complete and operable system.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

D. Products: Listed and classified by UL or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.08 EXTRA MATERIALS

A. Supply five spare control power transformer fuses of each type supplied for this project

B. Supply five spare lamps of each type supplied for this project.

C. Supply two spare relays of each type supplied for this project.

PART 2 - PRODUCTS

2.01 CIRCUIT BREAKER - MINIATURE

A. Manufacturer:
   1. Square D QOU Unit Mount Class 720
   2. Or equal

B. Agency Approvals:
   1. UL Listed

C. General:
   1. Surface, flush or DIN rail mounting in one-, two- and three-pole construction.
   2. Used for overcurrent protection and switching on both ac and dc systems.

D. Construction:
   1. Terminal lug wire size: 1- No.14 - No.2 AWG Cu or Al
   2. Reversible line and load lugs for convenient flush or surface mount wiring
   3. DIN mounted (symmetrical rail 35 x 7.5 DIN/EN 50 022)
   4. UL Listed as HACR type -- 15A to 70A
   5. Field installable quick connectors
   6. Single handle with internal common trip
   7. UL Listed 48VDC (5,000 AIR)

2.02 CONTROL POWER TRANSFORMER

A. Manufacturer:
   1. Cutler Hammer, Type MTE
   2. Square D
   3. Or equal

B. Agency Approvals:
   1. UL Listed
   2. CSA Certified

C. Construction:
   1. Epoxy encapsulated coils
   2. High quality silicon steel laminations
   3. Copper magnet wire
   4. 55 degree C rise, Class 105 insulation system
   5. Molded terminals

D. Electrical:
   1. Capacity:
      a. Select transformer VA rating based upon connected load with an additional 25 percent spare capacity.
   2. Primary terminals:
      a. 240 x 480VAC
      b. 230 x 460VAC
      c. 220 x 440VAC
      d. Finger-safe terminal covers
   3. Secondary terminals:

a. 120VAC
b. 115VAC
c. 110VAC
d. Finger-safe terminal covers

4. Fusing:
   a. Dual primary fuse block
   b. Single secondary fuse block
   c. Finger-safe fuse block covers
   d. Class CC fuses, sized for VA rating of transformer
5. Mounting:
   a. Back panel

2.03 PILOT DEVICE - INDICATING LIGHT

A. Manufacturer:
1. Allen Bradley Bulletin 800T/800H
2. Cutler-Hammer
3. Square D.
4. Or equal

B. Agency Approvals:
1. UL Listed
2. CSA Certified
3. CE Compliant

C. Mechanical:
1. Size: 30.5 mm
2. Environmental rating:
   a. NEMA 4/13 watertight/oiltight: NEMA 1, 12, 3R, 4 control panels
   b. NEMA 4/4X corrosion resistant: NEMA 4X control panels and remote control stations
3. Life expectancy: 200,000 operations
4. Push-to-test, transformer type, dual input

D. Electrical:
1. Input power: 120VAC
2. Lamp:
   a. High visibility, 28 chip cluster LED
   b. Color: red, green, amber, as scheduled
3. Lens: High impact plastic, colored to match lamp

E. Nameplate: Standard or jumbo with engraved service legend

F. Field Mounted Control Stations:
1. Type I Enclosure: NEMA 4X polycarbonate enclosure
2. Type II Enclosure: NEMA 4X stainless steel enclosure
3. Type III Enclosure: NEMA 7 hazardous location enclosure

2.04 PILOT DEVICE - PUSHBUTTON

A. Manufacturer:
   1. Allen Bradley Bulletin 800T/800H
   2. Cutler-Hammer
   3. Square D
   4. Or equal

B. Agency Approvals:
   1. UL Listed
   2. CSA Certified
   3. CE Compliant

C. Mechanical:
   1. Size: 30.5 mm
   2. Environmental rating:
      a. NEMA 4/13 watertight/oiltight: NEMA 1, 12, 3R, 4 control panels
      b. NEMA 4/4X corrosion resistant: NEMA 4X control panels and remote control stations
   3. Life expectancy: 10,000,000 operations
   4. Momentary contact, non-illuminated

D. Electrical:
   1. Rated Voltage: 120VAC
   2. Continuous current rating:
      a. AC: 10A
      b. DC: 2.5A
   3. Operational current:
      a. Make: 7200VA
      b. Break: 720VA
   4. Operator:
      a. Mushroom head: Emergency stop service
      b. Flush-head: All other services

E. Nameplate: Standard or jumbo with engraved service legend

F. Field Mounted Control Stations:
   1. Type I Enclosure: NEMA 4X polycarbonate enclosure
   2. Type II Enclosure: NEMA 4X stainless steel enclosure
   3. Type III Enclosure: NEMA 7 hazardous location enclosure

2.05 PILOT DEVICE - SELECTOR SWITCH

A. Manufacturer:
   1. Allen Bradley Bulletin 800T/800H
   2. Cutler-Hammer
   3. Square D.
   4. Or equal

B. Agency Approvals:
   1. UL Listed
   2. CSA Certified

3. CE Compliant

C. Mechanical:
   a. Size: 30.5 mm
   b. Environmental rating:
   c. NEMA 4/13 watertight/oiltight: NEMA 1, 12, 3R, 4 control panels
   d. NEMA 4/4X corrosion resistant: NEMA 4X control panels and remote control stations
2. Life expectancy: 1,000,000 operations
3. Maintained contact, non-illuminated (spring return from right or left where scheduled)

D. Electrical:
1. Rated Voltage: 120VAC
2. Continuous current rating:
   a. AC: 10A
   b. DC: 2.5A
3. Operational current:
   a. Make: 7200VA
   b. Break: 720VA
4. Operator:
   a. Standard knob operator, two-position, or three-position
   b. Keyed operator: where scheduled

E. Nameplate: Standard or jumbo with engraved service legend

F. Field Mounted Control Stations:
1. Type I Enclosure: NEMA 4X polycarbonate enclosure
2. Type II Enclosure: NEMA 4X stainless steel enclosure
3. Type III Enclosure: NEMA 7 hazardous location enclosure

2.06 RELAY - 120V GENERAL PURPOSE

A. Manufacturer:
1. Allen Bradley Bulletin 700-HB
2. IDEC RU Series
3. Or equal

B. Agency Approvals:
1. UL Listed
2. CE Marked

C. Mechanical:
1. Enclosure: Transparent dust cover
2. Contacts: Silver cadmium oxide
3. Insulating Material: Molded, high dielectric
4. Terminal Markings: In accordance with EN50-0005
5. Life expectancy: 10,000,000 operations
6. Operations:
   a. Pickup: 20 mS
   b. Dropout: 4 mS

c. Maximum Rate: Four operations per second

7. Blade style, quick connect terminals

D. Electrical:

1. Contacts:
   a. Double-pole, double throw
   b. Rated thermal current: 15A
   c. Make: 60A
   d. Break: 6A
2. Coil:
   a. 120 VAC + 10, -20 percent
   b. Consumption.
      1) Inrush: 2.85 VA
      2) Sealed: 1.9 VA
3. Voltage:
   a. Rated Insulation Voltage: 250V IEC-300V UL/CSA
   b. Dielectric Withstand Voltage:
      1) Pole-to-Pole: 1500V
      2) Contact to Coil: 6000V
      3) Contact to Frame: 4000V
4. Push-to-Test Operator
5. Pilot light

E. Relay Socket:

1. 11-blade
2. Finger-safe terminal
3. DIN rail mounted
4. Double tier
5. Retainer clip
6. Relay identification snap-in markers

2.07 RELAY - TIME DELAY

A. Manufacturer:

1. Allen Bradley Bulletin 700-HS
2. IDEC, RTE Series
3. Or equal

B. Agency Approvals:

1. UL Listed
2. CE Marked

C. Mechanical:

1. Insulation resistance: 100 Mohms, minimum
2. Dielectric strength: 1500VAC, 1 minute
3. Vibration resistance: 6N
4. Shock resistance: 500N
5. Operating temperature: -20 to 65 degrees C
6. Operating humidity: 45 to 85 percent, relative
7. Blade style: quick-connect terminals

D. Electrical:
   1. Contacts:
      a. Two Form C double-pole, double-throw
      b. 10A, 240VAC, resistive
   2. Timing functions:
      a. Delay on make/interval
      b. Delay on break/single shot
      c. Range: 0.1 seconds - 10 minutes, or 0.1 minutes - 10 hours
   3. Accuracy:
      a. Repeat: + 0.25 percent
      b. Voltage: + 1.0 percent
      c. Temperature error: + 2.0 percent
      d. Setting error: + 10.0 percent

E. Relay Socket:
   1. 11-blade
   2. Finger-safe terminal
   3. DIN rail mounted
   4. Double tier
   5. Retainer clip
   6. Relay identification snap-in markers

F. Electrical:
   1. Signal Channels: 5, 10, 15, or 20
   2. Operating: +/-30VDC
   3. Maximum Operating Voltage: 33VDC
   4. Maximum Operating Current: 0.5A
   5. Clamping Action Turn-On: 37.1V
   6. Maximum Clamping (8x20 micro-seconds): 52V
   7. Maximum Surge Voltage: 6kV
   8. Maximum Surge Current (8x20 micro-seconds): 2.5kA
   9. Response Time: Less than 1 nanosecond
   10. Operating & Storage Temperature: -40 to 85 degrees C.

2.08 TERMINAL BLOCK - INDICATING FUSED

A. Manufacturer:
   1. Allen Bradley Bulletin 1492-H4 (AC) or 1492-H5 (DC)
   2. Or equal

B. Agency Approvals:
   1. UL
   2. CSA
   3. IEC

C. Specifications:
   1. Voltage Rating: 300VAC/VDC
   2. Maximum Current: 12A
   3. Wire Range (Rated Cross Section): No.30 to no.12 AWG
   4. Leakage Current:

a. 2 mA at 300VAC
b. 2 mA at 24VDC

5. Working Voltage:
   a. 100 to 300VAC
   b. 10 to 57VAC/VDC
6. Fuse Size: 1/4 in x 1-1/4 in
7. Wire Strip Length 0.38 in
8. Tightening Torque: 3 to 7 lb-in
9. Density: 33 pcs./ft
10. Insulation Temperature Range: -40 to 221 degrees F
11. Accessories:
    a. Aluminum DIN Rail with Standoff Brackets
    b. End Barrier and End Anchors
    c. Side Jumper Insulating Sleeve
    d. Marking Systems

2.09 TERMINAL BLOCK - ISOLATING SWITCH

A. Manufacturer:
1. Allen Bradley Bulletin 1492-H7
2. Or equal

B. Agency Approvals:
1. UL
2. CSA
3. IEC

C. Specifications:
1. Voltage Rating: 300VAC/VDC
2. Maximum Current: 15A
3. Wire Range (Rated Cross Section): No.30 to No.12 AWG
4. Leakage Current:
   a. 2 mA at 300VAC
   b. 2 mA at 24VDC
5. Working Voltage:
   a. 100 to 300VAC
   b. 10 to 57VAC/VDC
6. Dummy Fuse Size: 1/4 in x 1-1/4 in
7. Wire Strip Length 0.38 in
8. Tightening Torque: 3 to 7 lb-in
9. Density: 33 pcs./ft
10. Insulation Temperature Range: -40 to 221 degrees F
11. Accessories:
    a. Aluminum DIN Rail with Standoff Brackets
    b. End Barrier and End Anchors
    c. Side Jumper Insulating Sleeve
    d. d. Marking Systems

2.10 TERMINAL BLOCK - OPEN STYLE

A. Manufacturer:
   1. Allen Bradley Bulletin 1492-CAM1
   2. Or equal

B. Agency Approvals:
   1. UL
   2. CSA
   3. IEC

C. Specifications:
   1. Voltage Rating: 600VAC/VDC
   2. Maximum Current: 65A
   3. Wire Range (Rated Cross Section): No.22 to No.8 AWG
   4. Wire Strip Length 0.38 in
   5. Tightening Torque: 10 to 16 lb-in
   6. Density: 30 pcs./ft
   7. Insulation Temperature Range: -40 to 221 degrees F
   8. Accessories:
      a. Aluminum DIN Rail with Standoff Brackets
      b. End Barrier and End Anchors
      c. Side Jumper Insulating Sleeve
      d. Marking Systems

PART 3 - CONSTRUCTION METHODS

3.01 FIELD MEASUREMENTS

A. Refer to the requirements of Section 16900 - Process Instrumentation & Control.

3.02 DELIVERY STORAGE AND HANDLING

A. Refer to the requirements of Section 16900- Process Instrumentation & Control.

3.03 INSTALLATION

A. Refer to the requirements of Section 16900- Process Instrumentation & Control.

3.04 TESTING AND START-UP SERVICES

A. Refer to the requirements of Section 16900- Process Instrumentation & Control.

3.05 TRAINING

A. Refer to the requirements of Section 16900- Process Instrumentation & Control.

END OF SECTION

SECTION 16920

INSTRUMENTATION DEVICES

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.

1. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
   a. ANSI/NFPA 70 - National Electrical Code and state amendments thereto.
   b. ANSI/IEEE C37.90 - IEEE Standard for Relays and Relay Systems Associated with Electric Power Apparatus.
   c. ANSI/IEEE C62.11- IEEE Standard for Metal-Oxide Surge Arresters for Alternating Current Power Circuits.
   d. ANSI/IEEE C62.34 - IEEE Standard for Performance of Low-Voltage Surge-Protective Devices (Secondary Arresters).
   e. ANSI/IEEE C62.41 - IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
2. CE - European Community, Applicable Directives.
   a. EN50005 - for Terminal Markings.
   b. EN50081-1- Generic Emission Standard.
   c. EN50082-1 - Generic Immunity Standard.
   d. EN61000-4-4 - Electromagnetic compatibility (EMC). Testing and measurement techniques.
   e. EN61000-4-5 - Electromagnetic compatibility (EMC). Testing and measurement techniques. Surge immunity test.
3. Canadian Standards Association (CSA), Specifications and Standards, current edition:
   a. CSA C22.2, Industrial Control Equipment.
4. CUL - Underwriter's Laboratories of Canada.
5. International Electrotechnical Commission (IEC), Specifications and Standards, current edition:
   a. IEC 60529 - Classification of Degrees of Protection Provided by Enclosures
6. National Electrical Manufacturers Association (NEMA), Specifications and Standards, current edition:
   a. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
   b. NEMA ICS 3 - Industrial Control and Systems: Medium Voltage Controllers Rated 2001 to 7200 Volts AC.
7. Underwriters Laboratories, Inc. (UL), Specifications and Standards, current edition:
   a. UL508 - Industrial Control Equipment.
   b. UL508A - Industrial Control Panels.
   c. UL 913 - Intrinsically Safe Specification.

d. UL94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

1.03 DESCRIPTION OF WORK

A. For the purpose of obtaining a complete and integrated process instrumentation and control system, the work specified herein shall be included under the scope of:
1. Section 16900 - Process Instrumentation & Control

1.04 DESIGN REQUIREMENTS

INSTRUMENTATION AND CONTROL COMPONENTS			
Tag Number	Description	Code	Notes
PIT-1-1-1	Ground Reservoir Pressure Transmitter	P4	
FE/FIT-1-3-1	Lower Zone Flow Meter	F1	
PIT-2-1-1	Lower Zone Booster Pump No.1 Inlet Pressure Transmitter	P4	
PIT-2-1-2	Lower Zone Booster Pump No.2 Inlet Pressure Transmitter	P4	
PIT-2-3-1	Lower Zone Booster Pump No.1 Outlet Pressure Transmitter	P4	
PIT-2-3-2	Lower Zone Booster Pump No.2 Outlet Pressure Transmitter	P4	
FE/FIT-2-4-1	Lower Zone Booster Pump Flow Meter	F1	
PIT-3-3-1	Lower Zone Pressure Transmitter	P4	
PIT-4-1-1	Upper Zone Booster Pump No.1 Inlet Pressure Transmitter	P4	
PIT-4-1-2	Upper Zone Booster Pump No.2 Inlet Pressure Transmitter	P4	
PIT-4-1-3	Upper Zone Booster Pump No.3 Inlet Pressure Transmitter	P4	
PIT-4-1-4	Upper Zone Booster Pump No.4 Inlet Pressure Transmitter	P4	
PIT-4-3-1	Upper Zone Booster Pump No.1 Outlet Pressure Transmitter	P4	
PIT-4-3-2	Upper Zone Booster Pump No.2 Outlet Pressure Transmitter	P4	
PIT-4-3-3	Upper Zone Booster Pump No.3 Outlet Pressure Transmitter	P4	
PIT-4-3-4	Upper Zone Booster Pump No.4 Outlet Pressure Transmitter	P4	
FE/FIT-5-1-1	Upper Zone Flow Meter	F1	
PIT-5-2-1	Upper Zone Pressure Transmitter	P4	
TSH/L-6-1-1	Pump Room High/Low Temperature Sensor	T2	
TSH/L-6-1-2	Chemical Room High/Low Temperature Sensor	T2	
TSH/L-6-1-3	Generator Room High/Low Temperature Sensor	T2	
TSH/L-6-1-4	MCC Room High/Low Temperature Sensor	T2	
LSH-9-1-1	Pump Room Flood Switch	L2	

1.05 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300.

1.06 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS

A. Submit operation & maintenance manuals and instructions in accordance with Section 01300.

1.07 QUALITY ASSURANCE

A. All materials, equipment, and parts shall be new and unused of current manufacture.

B. System supplier shall be responsible for providing all necessary accessories required for a complete and operable system.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

D. Products: Listed and classified by UL or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.01 F1 - FLOW ELEMENT AND TRANSMITTER, CONVENTIONAL MAGNETIC

A. Manufacturer:
   1. Electromagnetic Sensor:
      a. Badger M-series
   2. Signal Converter:
      a. Badger M-series

B. Electromagnetic Sensor:
   1. ANSI B 16.5 Class 150, fully rated carbon steel flanges.
   2. Elastomer (chlorobutyl rubber) liner.
   3. Flush elliptical Hastelloy C electrodes.
   4. Primary rated NEMA 6 (IP67).
   5. Include two 316 stainless steel grounding rings.
   6. Suitable for process fluid temperature of 150 degrees F.

C. Signal Converter:
   1. Remote mounted signal converter rated NEMA 4X (IP65).
   2. Isolated 4-20mA active output @ 800 Ohm load.
   3. Isolated digital pulse output: active or passive.
   4. Low flow cutoff programmable from 1 to 20%.
   5. Programmable time constant for pulse and analog outputs from 0.2 to 99 seconds.
   6. Minimum accuracy of actual flow of 0.15%.
   7. Digital signal processing to attenuate flow noise.
   8. 115/230 VAC, 48-63 HZ, 8 VA powered.
   9. 3-line, LCD display for actual flow rate, flow totalization, programming, and diagnostics.
   10. Read-out in gallons/minute for rate and gallons for total.

11. Be fully bi-directional for the display and outputs.
12. Totalize plus flow, minus flow, and sum the difference.
13. Be capable of measuring fluid with up to 5% non-conductive solids by weight without loss of accuracy or response.
14. Have empty pipe zero stabilization.

D. Installation:
1. Provide minimum of 5 diameters upstream and 2 diameters downstream of clear uninterrupted straight pipe the same size as the meter.
2. Supply an on/off switch within five feet of the meter.
3. Manufacturer to provide sufficient double shield signal cable.

E. Meter Application Information:

2.02 P4 - PRESSURE TRANSMITTER, GAUGE

A. Manufacturer:
1. Rosemount 3051 Series
2. Foxboro I/A Series
3. ABB 2600T Series
4. Siemens SITRANS Series

B. General:
1. High-performance gauge pressure transmitter with HART based digital communication capabilities.
2. Two-wire, capacitance, piezo-resistive, or silicon strain gauge

C. Construction:
1. The instrument shall be suitable for the following conditions:
   a. Humidity: 0-100 percent relative humidity.
   b. Ambient Temperature Limits: -40 to 185 degrees F.
2. Transmitter shall have dual-compartment housing with a moisture barrier completely isolating the electronic circuitry from the field wiring and calibration terminals.
3. Process-Wetted Parts:
   a. Drain/Vent Valves: 316 SST or Hastelloy C
   b. Process Flanges and Adapters: Plated carbon steel
   c. Wetted O-rings: Glass-filled TFE
4. Non-Wetted Parts:
   a. Electronics Housing: Low-copper aluminum
   b. Sensor Module Housing: CF-3M (Cast version of 316L SST, material per ASTM-A743)
   c. Bolts: 316SST
5. Sensor Module Fill Fluid: Silicone or inert halocarbon
6. Paint: Polyurethane
7. Cover O-rings: Buna-N
8. Isolating Diaphragm Material: 316L SST

D. Process Conditions:
1. Suitable for liquid, gas, and vapor service.
2. Process Temperature Limits:

a. Silicone fill: -40 to 250 degrees F.
b. Inert fill: 0 to 185 degrees F.

3. Overpressure Limit: 4,500 psig.

E. Measurement Ranges:
1. 2.5 in-H2O to 10,000 psig

F. Outputs:
1. Outputs shall be a 4-20 mA analog signal, user-selectable linear or square root, with a superimposed digital signal, using HART Protocol.
2. Analog output shall be adjustable remotely with a field communicator or control system.
3. Zero and span adjustments shall also be available on the transmitter.

G. Performance:
1. The transmitter shall meet the following performance criteria as a minimum:
   a. Total Performance: +/-0.15 percent of span.
   b. Stability: +/-0.125 percent of URL for 5 years.
   c. Accuracy: +/-0.075 percent of Calibrated Span.
   d. Total Ambient Temperature Effect: +/- (0.0125 percent URL + 0.0625 percent span).
   e. Time Response:
      1) Dead Time: 45 milliseconds (nominal)
      2) Time Constant: 55 milliseconds
      3) Update Rate: 20 times per second (minimum)
   f. Vibration Effect: +/-0.1 percent of URL when tested from 15 to 2,000 Hz per SAMA PMC 31.1.
   g. RFI Effect: Less than +/-0.1 percent of span from 20 to 1,000 MHz for field strength of 30 V/m per IEC 801-3.

H. Electrical:
1. Electrical connections shall be 1/2-inch NPT conduit.
2. Transmitter shall operate on 10.5 to 55 V dc, with no load.
3. Enclosure rating: NEMA 4X (IP65), minimum.

I. Data Storage:
1. Transmitter data shall be stored in nonvolatile EEPROM memory.
2. Sensor module characterization data shall be an integral part of the sensor module.

J. Software Functionality:
1. Transmitter shall be capable of digital communication over the 4-20 mA output loop without disruption, using the HART Communications Protocol.
2. The transmitter shall perform continuous diagnostics, capable of self-test functions and be able to provide specific diagnostic information locally on the meter and remotely.
3. The configuration capabilities of the transmitter shall allow the user the ability to input and store information including the range, engineering units, damping, square root or linear output, drain/vent valves, flange, and O-ring materials, date, message, descriptor, tag number, serial number, and remote seal information.
4. Process variable and sensor module temperature information shall be available digitally.
5. Transmitter software security shall be user selectable.
6. Upscale/Downscale failure mode shall be user selectable.

K. Options:
   1. Digital LCD indicator with diagnostic capabilities.
   2. Mounting brackets.

2.03 T2 - TEMPERATURE SWITCH, AIR COIL SENSING

A. Manufacturer:
   1. Honeywell Model T631C1103
   2. Johnson/Controls/Penn Model A19BAC-1
   3. Or equal

B. General:
   1. Wide range control for applications with air coil sensing element
   2. Dustproof NEMA 1 enclosures
   3. UL Listed and CSA Certified

C. Specifications:
   1. Control Range: 30-100 degrees F
   2. Differential: 5 degrees F
   3. Switch Type: SPDT
   4. Application: Heating/Cooling
   5. Hydraulic Capillary:
      a. Dimensions: 1-3/8-inch by 2-1/4-inch, coiled
   6. Inductive Contact Ratings
      a. 120VAC/16A
      b. 240VAC/8A

PART 3 - NOT USED

END OF SECTION

SECTION 16960

ETHERNET NETWORKING EQUIPMENT

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. Applicable provisions of General Conditions shall govern the work of this section.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent applicable.
   1. American National Standards Institute/Instrument Society of America (ANSI/ISA), Specifications and Standards, current edition:
      a. ANSI/ISA-5.1-1984 - Instrumentation Symbols and Identification .
      b. ANSI/ISA-5.3-1983 - Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic, and Computer Systems.
      c. ANSI/ISA-95.00.01-2000 - Enterprise Control System Integration, Part 1: Models and Terminology.
      d. ANSI/ISA-TR99.00.01-2004, Security Technologies for Manufacturing and Control Systems.
      e. ANSI/ISA-TR99.00.02-2004, Integrating Electronic Security into the Manufacturing and Control Systems Environment.
   2. Telecommunications Industry Association (TIA), Electronic Industries Alliance (EIA), Specifications and Standards, current edition:
      a. TIA/EIA-568-A - Commercial Building Telecommunications Wiring.
      b. TIA/EIA-569-A - Commercial Building Standards for Telecommunications Pathways and Spaces.
      c. TIA/EIA-606 - Documentation.
      d. TIA/EIA-607 - Commercial Building Bonding and Grounding Requirements.
      e. TIA/EIA TSB-67 - Transmission Performance for Field Testing of Unshielded Twisted Pair Cabling Systems.
      f. TIA/EIA TSB-72 - Centralized Optical Fiber Cabling Guidelines.
      g. TIA/EIA-526-14 - Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant.
      h. TIA/EIA-429-AAA - Detail Specification for 62.5 - UM Core Diameter/125-UM Platting Diameter Class 1A Multimode, Graded Index Optical Wave Guide Fibers.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300.

B. Submit the following information specifically for Ethernet networking equipment:
   1. Literature sufficient in scope to demonstrate compliance with the requirements of this specification.

1.04 FACTORY TESTING

A. Refer to the requirements of Section 16900 - Process Instrumentation & Control.

1.05 OPERATION/MAINTENANCE MANUALS AND INSTRUCTIONS

A. Submit operation & maintenance manuals and instructions in accordance with Section 01300.

B. Submit operation and maintenance manuals for the equipment specified herein as part of the complete, integrated manual for the process instrumentation and control system and in accordance with the requirements specified under 16900 - Process Instrumentation & Control.

1.06 QUALITY ASSURANCE

A. All materials, equipment, and parts shall be new and unused of current manufacture.

B. System supplier shall be responsible for providing all necessary accessories required for a complete and operable system.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

D. Products: Listed and classified by UL or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.01 UTP PATCH CABLE

A. Manufacturer:
   1. Belden DataTwist 350 (1752A).
   2. Or equal.

B. General:
   1. Non-plenum rated 4 pair UTP (unshielded twisted pair) cable, 24 AWG, stranded tinned copper, Polyolefin insulated, adjoined singles, flexible PVC jacket. Jacket is sequentially marked at two foot intervals.
   2. High flexibility patch cordage. RJ-45 compatible for either T568A or T568B configurations.
   3. Design minimizes changes in electrical characteristics due to bending and kinking associated with patch cables.
   4. Patch cable impedance is matched with DataTwist 350 horizontal cables to reduce signal reflections caused by impedance mismatches and decrease system return loss.
   5. Resistant to attenuation increases due to high humidity environments.

C. Physical Characteristics:
   1. Temperature range: -20 TO 80 deg. C.
   2. Insulation material: Polyolefin.
   3. Jacket material: PVC.
   4. Maximum pulling tension: 40 lbs.

5. Minimum conductor OD: 0.022-in.
6. Minimum insulation OD: 0.037-in.
7. Minimum bend radius: 0.25-in.
8. Flame test: UL 1581 Vertical Tray.
9. Color code:
    a. Pair 1: white/blue & blue
    b. Pair 2: white/orange & orange
    c. Pair 3: white/green & green
    d. Pair 4: white/brown & brown

D. Electrical Characteristics:
1. Maximum operating voltage: 300 V rms.
2. Nominal capacitance at 1 kHz: 15 pF/ft.
3. Nominal velocity of propagation: 70 percent.
4. Delay skew (nS/1000-ft): 25 maximum.
5. Delay at 100 MHz (nS/1000-ft): 510 maximum.
6. Capacitance unbalance (pF/1000-ft): 66.0 maximum.
7. DCR at 20C (Ohms/1000-ft): 9.0 maximum.
8. DCR unbalance (percent): 3.0 maximum.

E. Usage:
1. Instrumentation & Control system UTP patch cable.

PART 3 - NOT USED

END OF SECTION

SECTION 16961

VIDEO MONITORING SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

1. A new Ethernet based digital video security system will be added. Major components of the new system will be:
   a. New cameras will be installed as shown on the drawings.

1.02. Scope of work

1. Provide and install digital, Ethernet based video cameras as shown on the drawings.
2. Provide and install new Ethernet cabling, as shown on the drawings to connect the new cameras to the longwatch box.
   a. For all runs less than 90m, contractor may use CAT5E, or better, Ethernet cabling.
   b. For all runs greater than 90m, contractor shall use fiber optic, single mode Ethernet cabling with suitable fiber-to-copper transceivers.

PART 2 - PRODUCTS

2.01 COMPONENTS

1. Video cameras
   a. Provide and install digital video cameras as shown on the drawings.
   b. Fixed cameras are to be proceed, as shown on the drawings.
   c. Minimum camera requirements:
      1) Fixed cameras (indoor and outdoors): Shall be Axis 211M Network Cameras, or equal. Provide suitable enclosures for outdoor use.
      2) Significant features of the Axis cameras are:
         a) Low light nighttime capability
         b) High dynamic range
         c) Image stabilization
   d. Contractor shall provide the following services for new cameras:
      1) Provide a written plan, recommending resolution and frame rate setting for each camera, to be reviewed by Engineer and Owner. Configure cameras with settings determined in final plan.
      2) Before cameras are installed or camera wiring has been run, perform a site review with Owner and Engineer to verify camera locations and areas covered by cameras are acceptable to Owner. Make minor camera location changes requested as a result of the review.
      3) After camera installation, assist Owner in configuration of cameras for optimal day/night operation taking into account the following conditions:
         a) Site lighting.
         b) Daytime lighting and reflections.
         c) Light from passing vehicle and train traffic.

PART 3 - NOT USED

END OF SECTION

17

DIVISION 17

DRAWINGS

All drawings, which have been prepared on behalf of the Owner, are bound in a separate volume entitled, "Oak Creek Water and Sewer Utility," Contract 4931-09-01. These drawings are hereby made part of this contract.

PUETZ ROAD BOOSTER STATION
OAK CREEK SEWER AND WATER UTILITY
CITY OF OAK CREEK
MILWAUKEE COUNTY, WISCONSIN

PROJECT NO. 08101 & 08102
PART A-BOOSTER STATION CONSTRUCTION
PART B-TRANSMISSION MAIN CONSTRUCTION

AUGUST 2009

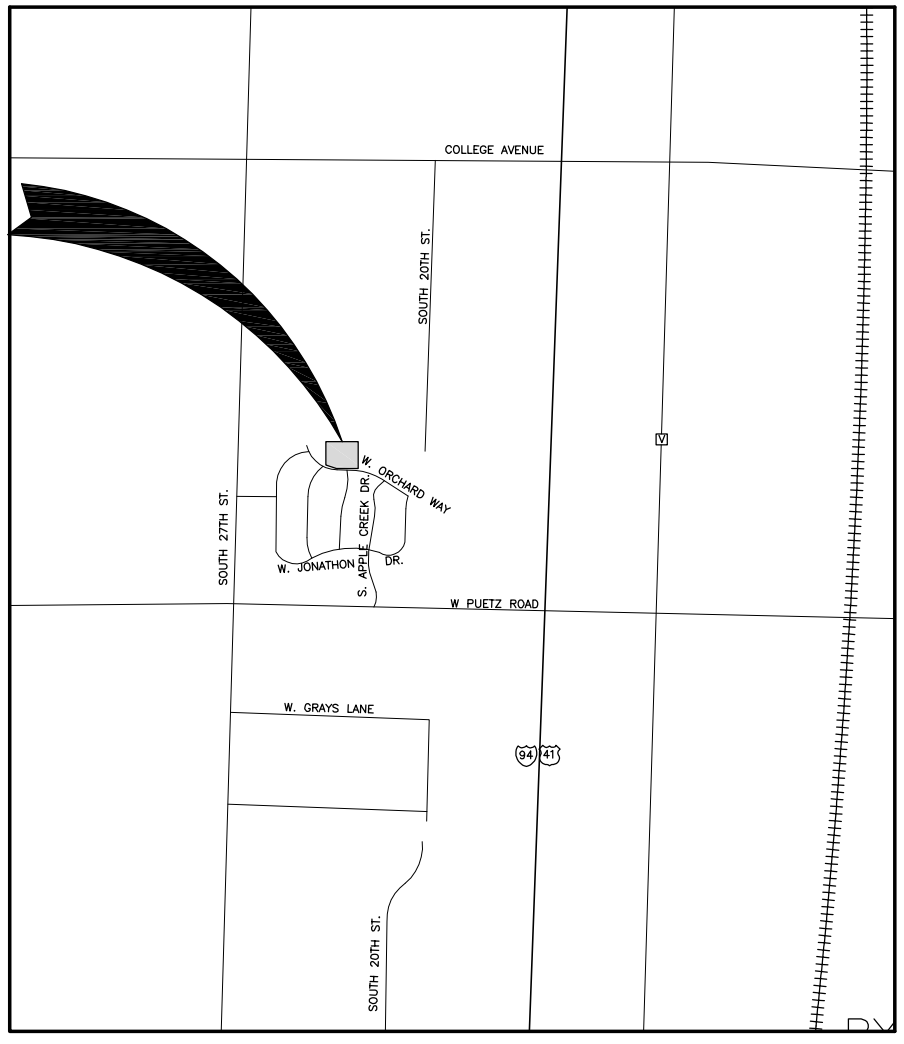
VICINITY MAP

NOTE:
ALL DRAWINGS CONTAINED IN THIS SET HAVE BEEN REDUCED TO HALF SIZE.

NOTE:
EXISTING UTILITIES SHOWN ON PLANS ARE APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING EXACT LOCATIONS AND ELEVATIONS OF ALL UTILITIES, WHETHER SHOWN OR NOT, FROM THE OWNERS OF THE RESPECTIVE UTILITIES. ALL UTILITY OWNERS SHALL BE NOTIFIED FOR LOCATES BY THE CONTRACTOR 72 HOURS PRIOR TO EXCAVATION.

NOTE:
ALL EROSION CONTROL MEASURES SHALL BE IN PLACE PRIOR TO CONSTRUCTION AND SHALL CONFORM TO THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES CONSTRUCTION SITE EROSION CONTROL AND TECHNICAL STANDARDS.

PROJECT LOCATION



LOCATION MAP

SA.	Consultant: Robert E. Lee & Associates, Inc.	CITY OF OAK CREEK, WISCONSIN		APPROVED BY _____ UTILITY ENGINEER DATE
ST.		DESIGNED BY DATE: D.A.M. 8/13/09	DRAWN BY DATE: R.L.B. 8/13/09	CHECKED BY DATE: K.A.K. 8/13/09
W.				APPROVED BY _____ CITY ENGINEER DATE
G.				
E.	ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES	LOCATION MAPS IN: PUETZ ROAD BOOSTER STATION		SCALE: PLAN HOR. N.T.S. / PROFILE HOR. N.T.S. VER. N.T.S.
T.				SHEET: 1 OF 53
I.				
TS.	4664 GOLDEN POND PARK CT. HOBART, WISCONSIN 54155 PHONE: 920-662-9641 FAX: 920-662-9141 WWW.RELEEINC.COM			
PP.				
	REVISION BY DATE	FILE NO: 08101		00-G-01

File: (N:\PROJ\OAK\08101\dwg\08101G.dwg Plot Date: Sep 01, 2009 - 1:46pm)
LAYOUT:
PLAN VIEW: PLAN

INDEX TO SHEETS

SHEET NO.	CONTRACT	DWG. NO.	TITLE
		00 - GENERAL	
1	A & B	00-G-01	LOCATION MAPS
2	A & B	00-G-02	INDEX TO SHEETS
3	A	00-G-03	SYMBOLS AND ABBREVIATIONS
4	A & B	00-G-04	LEGEND AND GENERAL NOTES
5	A	00-G-05	PROCESS SCHEMATIC
6	A	00-G-06	EQUIPMENT DESIGNATION AND DESIGN DATA
7	A	00-E-01	ELECTRICAL SYMBOLS AND ABBREVIATIONS
		05-SITE	
8	A & B	05-D-01	EXISTING SITE AND SITE DEMOLITION PLAN
9	A & B	05-C-01	SITE AND YARD PIPING PLAN
10	A	05-C-02	GRADING AND EROSION CONTROL PLAN
11	B	05-C-03	PROPOSED WATERMAIN - STA. 40+00 TO STA. 41+28
12	B	05-C-04	PROPOSED WATERMAIN - WEST ORCHARD WAY STA. 9+35 TO STA. 10+48
13	B	05-C-05	PROPOSED WATERMAIN - WEST ORCHARD WAY STA. 10+48 TO STA. 14+24
14	A	05-E-01	ELECTRICAL SITE PLAN
		07-ONE - LINE DIAGRAM	
15	A	07-E-01	ONE LINE DIAGRAM
		09-PROCESS AND INSTURMENTATION DIAGRAM	
16	A	09-E-01	PROCESS INSTRUMENTATION DIAGRAM
		100 - BOOSTER PUMP STATION PLANS	
17	A	100-AS-01	FOUNDATION PLAN
18	A	100-AS-02	ARCHITECTURAL/STRUCTURAL FLOOR PLAN
19	A	100-AS-03	ARCHITECTURAL/STRUCTURAL SECTION
20	A	100-AS-04	ARCHITECTURAL/STRUCTURAL SECTION
21	A	100-AS-05	ARCHITECTURAL/STRUCTURAL SECTION
22	A	100-AS-06	BUILDING ELEVATIONS
23	A	100-AS-07	ROOF FRAMING PLAN
24	A	100-M-01	MECHANICAL PLAN
25	A	100-M-02	MECHANICAL SECTION
26	A	100-M-03	MECHANICAL SECTION
27	A	100-M-04	MECHANICAL SECTION
28	A	100-M-05	MECHANICAL SECTION
29	A	100-M-06	MECHANICAL SECTION
30	A	100-E-01	LIGHTING PLAN
31	A	100-E-02	ELECTRICAL POWER PLAN
32	A	100-E-03	PROCESS INSTRUMENTATION PLAN
33	A	100-H-01	HVAC PLAN
34	A	100-P-01	SANITARY DRAIN AND VENT PLAN
35	A	100-P-02	SANITARY WASTE AND VENT PIPING ISOMETRIC
		200 - DETAILS / SCHEDULES	
36	A & B	200-C-01	EROSION CONTROL DETAILS/INLET PROTECTION
37	A & B	200-C-02	EROSION CONTROL DETAILS/DITCH CHECK
38	A & B	200-C-03	EROSION CONTROL DETAILS/SHEET FLOW
39	A	200-AS-01	STRUCTURAL NOTES
40	A	200-AS-02	DOOR AND WINDOW SCHEDULES AND DETAILS
41	A	200-AS-03	TYPICAL REINFORCING AND CONCRETE DETAILS
42	A	200-AS-04	ARCHITECTURAL DETAILS
43	A	200-AS-05	ARCHITECTURAL DETAILS
44	A	200-AS-06	ARCHITECTURAL DETAILS
45	A	200-M-01	PIPE PENETRATION DETAILS
46	A & B	200-M-02	THRUST BLOCKING DETAILS
47	A & B	200-M-03	PIPE BEDDING DETAILS
48	A & B	200-M-04	WATERMAIN DETAILS
49	B	200-M-05	WATERMAIN DETAILS
50	A & B	200-M-06	PRESSURE GAUGE DETAILS
51	A	200-E-01	ELECTRICAL DETAILS
52	A	200-E-02	ELECTRICAL DETAILS
53	A	200-P-01	PLUMBING SCHEDULE AND DETAILS

DRAWING NUMBER DESIGNATION

120-E-03

- DRAWING NUMBER
- DISCIPLINE IDENTIFIER
- SECTION IDENTIFIER

DISCIPLINE DESIGNATION

- G - GENERAL
- C - CIVIL
- A - ARCHITECTURAL
- S - STRUCTURAL
- M - PROCESS
- P - PLUMBING
- H - HVAC
- E - ELECTRICAL
- D - DEMOLITION

Plot By: N:\AKOS\JOBS\140101\Dwg\INDEX.dwg
Plot Date: Sep 01, 2009 - 1:48pm
LAYOUT: LAYOUT
PLAN VIEW: PLAN

SA.
ST.
W.
G.
E.
T.
I.
TS.
PP.

Consultant:
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FAX: 920-662-9141
WWW.RELEEINC.COM

REVISION BY | DATE

CITY OF OAK CREEK, WISCONSIN

DESIGNED BY	DATE	DRAWN BY	DATE	CHECKED BY	DATE
D.A.M.	8/13/09	R.L.B.	8/13/09	K.A.K.	8/13/09

INDEX TO SHEETS
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	2
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

00-G-02

GATE VALVE

BUTTERFLY VALVE

GLOBE VALVE

NEEDLE VALVE

PLUG VALVE

BALL VALVE

CENTER GUIDE CHECK VALVE

CHECK VALVE

BALL CHECK VALVE

DIAPHRAGM VALVE

KNIFE GATE VALVE

ACTUATED VALVE, S-SOLENOID, M-MOTOR, P-PNEUMATIC

SELF ACTUATING PRESSURE REGULATING VALVE

POWER OPERATED VALVE FOR VALVE SEE SPECS

ANGLE VALVE

RELIEF VALVE

THERMOSTATICALLY CONTROLLED VALVE

ROTAMETER

STRAINER

PIPELINE FLUSHING COCK CONNECTION

INSULATED PIPE

FLANGED JOINT

GROOVED PIPE COUPLINGS

FLANGED COUPLING ADAPTER

MECHANICAL JOINT

MECHANICAL PIPE COUPLING

FLEXIBLE RUBBER COUPLING

STAINLESS STEEL FLEXIBLE COUPLING

SANITARY TRAP

DIRECTION OF FLOW

UNION

REDUCER OR INCREASER

MANUAL AIR VENT

MORTAR GROUT OR PLASTER

BRICK (ELEVATION)

12X24 — FIRST DIMENSION DUCT SIDE SHOWN
SECOND DIMENSION SIDE NOT SHOWN

SUPPLY OR OUTSIDE AIR DUCT

EXHAUST OR RETURN AIR DUCT

AIR TURNING VANES IN DUCT

OBVD — OPPOSED BLADE VOLUME DAMPER

FD — FIRE DAMPER

FDC — FLEXIBLE DUCT CONNECTION

FLOW — EXTRACTOR

WALL LOUVER

(W X H) NO. CFM — EXHAUST OR RETURN AIR GRILLE OR REGISTER (W X H = WIDTH X HEIGHT, INCHES)

(W X H) NO. CFM — SUPPLY GRILLE OR REGISTER, (W X H = WIDTH X HEIGHT, INCHES)

CENTRIFUGAL PUMP, FAN, BLOWER OR METERING PUMP

FE — FLOW METER, OR ELEMENT

FL — FLOW SWITCH

T — THERMOMETER

P — PRESSURE GAUGE

PS — PRESSURE SWITCH

HOSE RACK

UTILITY STATION (PLAN)

T — THERMOSTAT

SANITARY MANHOLE

CONNECTING LINES, SINGLE LINE SCHEMATIC DIAGRAMS

NON-CONNECTING LINES, SINGLE LINE SCHEMATIC DIAGRAMS

C/L — CENTERLINE

FLEXIBLE PIPE CONNECTION (SINGLE LINE PIPE)

@ — AT

& — AND

DIA. — DIAMETER

L — ANGLE

PL — PLATE OR PROPERTY LINE

101 — DOOR NUMBER

101 — ROOM NUMBER

8" STD — PIPING DESIGNATION

P12345 — EQUIPMENT DESIGNATION

GRATING, ARROW DESIGNATES DIRECTION OF SPAN

CHECKER PLATE

STEEL OR STAINLESS STEEL

ALUMINUM

WOOD

RIGID INSULATION

NEOPRENE

OPENING OR DEPRESSION IN SLAB OR WALL

OPENING WITH GRATING COVER

OPENING W/ CHECKER PLATE COVER

STUD WALL (PLAN)

FIBERGLASS INSULATION

CELLULAR INSULATION

BM-1 — BENCHMARK

3:1 — SLOPE (3 HORZ. TO 1 VERT.)

JOINT FILLER

OR — PVC WATER STOP

NATURAL GROUND OR GRADE

BEDROCK

TP-1 — SOIL BORING OR TEST PIT AND DESIGNATION

SLIDE GATE OPENING AND DESIGNATION

REINFORCEMENT IN SECTION

REINFORCEMENT PLAN OR ELEVATION

CONCRETE (POURED)

CONCRETE (BLOCK)

BRICK (PLAN OR SECTION)

CONCRETE BLOCK

EXAMPLE OF SECTION NUMBERING SYSTEM

(1) SECTION CUT ON DRAWING S251

5 / S260 — SECTION NUMBER; DRAWING ON WHICH SECTION APPEARS

(2) ON DRAWING S260, THIS SECTION IS IDENTIFIED BY:

5 / S251 — SECTION NUMBER; DRAWING FROM WHICH THE SECTION WAS TAKEN

SA.
ST.
W.
G.
E.
T.
I.
TS.
PP.

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CITY OF OAK CREEK, WISCONSIN

DESIGNED BY	DATE	DRAWN BY	DATE	CHECKED BY	DATE
D.A.M.	8/13/09	R.L.B.	8/13/09	K.A.K.	8/13/09

SYMBOLS AND ABBREVIATIONS
IN: PUETZ ROAD BOOSTER STATION

APPROVED BY
UTILITY ENGINEER DATE

APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	3
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

REVISION BY DATE

FILE NO: 08101

00-G-03

File: R:\MKE\LAKE\LAKE101\Cad\DWG\SYMBOLS.dwg
Plot Date: Sep 01, 2009 - 1:50pm

PLAN VIEW: PLAN
LAYOUT: LAYOUT

LEGEND

PROPOSED	EXISTING	
○	○	FIRE HYDRANT
⊗	⊗	WATER VALVE/CURB STOP
Ⓦ	Ⓦ	WATER MANHOLE
▽	▽	REDUCER/INCREASER
○	○	SANITARY MANHOLE
◎	◎	STORM MANHOLE
◉	◉	OPEN STORM MANHOLE
▤	▤	STORM INLET
▣	▣	STORM INLET MANHOLE
✳	✳	SPRINKLER HEAD
	⊠	TRAFFIC SIGNAL
	■	POST
	●	IRON PIPE/ROD
	△	PK NAIL
	⌖	RECORDED COUNTY MONUMENT

- SB — SOIL BORING
- P — POWER POLE
- P — POWER POLE W/GUY WIRE
- LIGHT POLE
- E — ELECTRIC MANHOLE
- E — ELECTRIC METER
- T — TELEPHONE MANHOLE
- T — TELEPHONE PEDESTAL
- TV — CABLE TV MANHOLE
- TV — CABLE TV PEDESTAL
- G — GAS VALVE
- G — GAS METER
- M — MAILBOX
- SIGN

- TREE/SHRUB TO BE REMOVED
- DECIDUOUS TREE
- CONIFEROUS TREE
- BUSH
- CONCRETE
- WETLANDS
- (POINT OF ELEVATION) 750.65 — SPOT ELEVATION
- EXISTING CULVERT
- HANDICAP PARKING
- TO BE DEMOLISHED

- EDGE OF PAVEMENT
- EDGE OF GRAVEL
- EXISTING CURB & GUTTER
- TREE/BRUSH LINE
- 750 — EXISTING CONTOUR LINE
- RETAINING WALL
- FENCE
- SILT FENCE

- PROPOSED SANITARY SEWER
- 8"SS — 8"SS — EXISTING SANITARY SEWER (SIZE NOTED)
- PROPOSED STORM SEWER
- 10"ST — 10"ST — EXISTING STORM SEWER (SIZE NOTED)
- PROPOSED WATERMAIN
- 6"W — 6"W — 6"W — EXISTING WATERMAIN (SIZE NOTED)
- 4"FM — 4"FM — EXISTING FORCEMAIN (SIZE NOTED)
- G — G — G — GAS LINE
- OT — OT — OT — OVERHEAD TELEPHONE LINE
- T — T — T — UNDERGROUND TELEPHONE LINE
- E — E — E — OVERHEAD ELECTRIC LINE
- E — E — E — UNDERGROUND ELECTRIC LINE
- OTV — OTV — OTV — OVERHEAD CABLE TV LINE
- TV — TV — TV — CABLE TV LINE
- R/W LINE
- PROPERTY LINE
- EASEMENT LINE
- BUILDING SETBACK LINE
- SECTION LINE

GR.	GRAVEL	WM	WATERMAIN	EX	EXISTING
BIT.	BITUMINOUS	HYD.	HYDRANT	EOR	END OF RADIUS
ASPH.	ASPHALT PAVEMENT	WV	WATER VALVE	B-B	BACK TO BACK (OF CURB)
CONC.	CONCRETE	SAN	SANITARY SEWER	R/W	RIGHT OF WAY
SW	SIDEWALK	MH	MANHOLE	T.O.C.	TOP OF CURB
BLDG	BUILDING	ST	STORM SEWER	F.L.	FLOW LINE
HSE	HOUSE	CB	CATCH BASIN	C/L	CENTERLINE
PED	PEDESTAL	TELE	TELEPHONE	INV.	INVERT
PP	POWER POLE	ELEC	ELECTRIC	CMP	CORRUGATED METAL PIPE
LP	LIGHT POLE	TV	TELEVISION	RCP	REINFORCED CONCRETE PIPE
BM	BENCH MARK	R	RADIUS	CULV.	CULVERT
PW	POTABLE WATER	CLS	CHLORINE LINE		

DEMOLITION NOTES

1. EXISTING ASPHALT AND BASE COURSE MAY BE PULVERIZED AND STOCKPILED ON SITE FOR FUTURE USE.
2. EXISTING GAS, ELECTRIC, CABLE TELEVISION AND TELEPHONE TO BE REMOVED AND/OR RELOCATED. ALL WORK AND ASSOCIATED COSTS SHALL BE RESPONSIBILITY OF THE GENERAL CONTRACTOR.

UTILITY INFORMATION:

UTILITIES PRESENT:
PRIOR TO CONSTRUCTION, CONTACT DIGGERS HOTLINE FOR EXACT LOCATIONS OF UNDERGROUND UTILITIES

DIGGERS HOTLINE = 1-800-242-8511

NOTE

1. A MINIMUM OF 6.5 FEET OF COVER SHALL BE MAINTAINED OVER ALL WATERMAIN.
2. FIELD VERIFY LOCATION OF EXISTING UTILITIES. IF EXISTING LOCATIONS DIFFER FROM WHAT IS INDICATED ON THE PLANS, **CONTACT ENGINEER,** PRIOR TO CONTINUED WORK.
3. TO ACQUIRE USGS DATUM FROM CITY DATUM ADD 580.6.
4. ALL UNDERGROUND DUCTILE IRON PIPING SHALL BE POLYETHYLENE WRAPPED WITH TWO LAYERS. ALL UNDERGROUND DUCTILE IRON PIPING WITH BOLTS SHOULD BE WRAPPED WITH THREE LAYERS.
5. ALL VALVES SHALL BE OPERATED BY THE UTILITY.

BENCHMARK	BENCHMARK ESTABLISHED BY: ROBERT E. LEE & ASSOCIATES, INC. **FIELD VERIFY BENCHMARKS FOR ACCURACY.**	
NO.	DESCRIPTION	ELEV.
1	TOP NUT ON THE FIRE HYDRANT	194.61
2	TOP NUT ON THE FIRE HYDRANT	197.86
3	TOP NUT ON THE FIRE HYDRANT	191.02

File: R:_WORK_AREA\08101\dwg\LEGEND.dwg
Plot Date: Sep 01, 2009 - 2:53pm
LAYOUT: LAYOUT
PLAN VIEW: PLAN

SA. ST. W. G. E. T. I. TS. PP.

Consultant:
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REVISION BY DATE

CITY OF OAK CREEK, WISCONSIN

DESIGNED BY DATE	DRAWN BY DATE	CHECKED BY DATE
D.A.M. 8/13/09	R.L.B. 8/13/09	K.A.K. 8/13/09

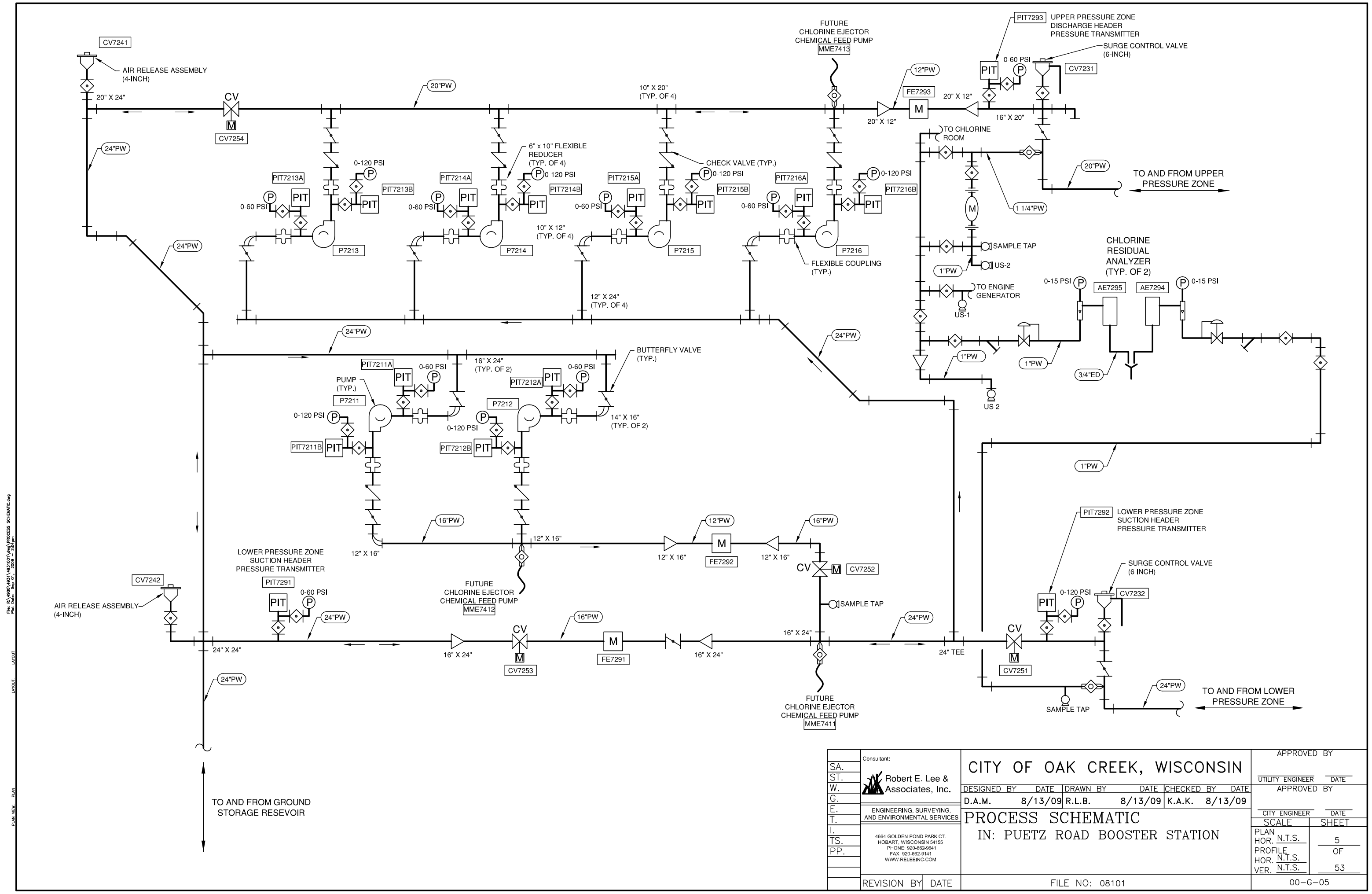
LEGEND AND GENERAL NOTES
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	4
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

00-G-04



SA.	Consultant: Robert E. Lee & Associates, Inc.	CITY OF OAK CREEK, WISCONSIN	APPROVED BY UTILITY ENGINEER DATE
ST.		DESIGNED BY DATE: D.A.M. 8/13/09 | DRAWN BY DATE: R.L.B. 8/13/09 | CHECKED BY DATE: K.A.K. 8/13/09	APPROVED BY CITY ENGINEER DATE
W.			
G.			
E.			
T.	ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES	PROCESS SCHEMATIC IN: PUETZ ROAD BOOSTER STATION	SCALE: PLAN HOR. N.T.S. / PROFILE HOR. N.T.S. VER. N.T.S.
I.			SHEET: 5 OF 53
TS.			
PP.	4664 GOLDEN POND PARK CT. HOBART, WISCONSIN 54155 PHONE: 920-662-9641 FAX: 920-662-9141 WWW.RELEEINC.COM		
	REVISION BY DATE	FILE NO: 08101	00-G-05

File: R:\ACAD\LAYOUTS\08101(Puetz) PROCESS SCHEMATIC.dwg
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PLAN VIEW: PLAN

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Plot Date: Sep 01, 2009 – 2:06pm

LAYOUT: LAYOUT

PLAN VIEW: PLAN

PUETZ ROAD BOOSTER PUMP STATION

EQUIPMENT DESIGNATIONS

7000 PUETZ BOOSTER PUMP STATION
  7000 GENERAL SITE

  7100 MCC ROOM
    MCC7170 MOTOR CONTROL CENTER
    TFR7174 LIGHTING AND POWER TRANSFORMER
    PNL7175 LIGHTING AND POWER PANEL
    PNL7190 INSTRUMENTATION PANEL IP-1
    UH7160 UNIT HEATER
      TS7160 TEMPERATURE SWITCH

  7200 BOOSTER PUMP ROOM
    P7211 LOW ZONE BOOSTER PUMP NO. 1
      PIT7211A PRESSURE TRANSMITTER
      PIT7211B PRESSURE TRANSMITTER
    P7212 LOW ZONE BOOSTER PUMP NO. 2
      PIT7212A PRESSURE TRANSMITTER
      PIT7212B PRESSURE TRANSMITTER
    P7213 HIGH ZONE BOOSTER PUMP NO. 1
      PIT7213A PRESSURE TRANSMITTER
      PIT7213B PRESSURE TRANSMITTER
    P7214 HIGH ZONE BOOSTER PUMP NO. 2
      PIT7214A PRESSURE TRANSMITTER
      PIT7214B PRESSURE TRANSMITTER
    P7215 HIGH ZONE BOOSTER PUMP NO. 3
      PIT7215A PRESSURE TRANSMITTER
      PIT7215B PRESSURE TRANSMITTER
    P7216 HIGH ZONE BOOSTER PUMP NO. 4
      PIT7216A PRESSURE TRANSMITTER
      PIT7216B PRESSURE TRANSMITTER
    CV7231 SURGE CONTROL VALVE NO.1
    CV7232 SURGE CONTROL VALVE NO. 2
    CV7241 AIR RELEASE VALVE
    CV7242 AIR RELEASE VALVE
    CV7251 FLOW CONTROL VALVE NO. 1
    CV7252 FLOW CONTROL VALVE NO. 2
    CV7253 FLOW CONTROL VALVE NO. 3
    CV7254 FLOW CONTROL VALVE NO. 4
      EF7250 PUMP ROOM EXHAUST FAN
      D7250A INTAKE DAMPER NO. 1
      D7250B INTAKE DAMPER NO. 2
      TS7250 TEMPERATURE SWITCH
    UH7261 PUMP ROOM UNIT HEATER NO. 1
      TS7261 TEMPERATURE SWITCH
      UH7262 PUMP ROOM UNIT HEATER NO. 2
      TS7262 TEMPERATURE SWITCH
    C7281 PUMP ROOM VENTILATION CONTACTOR
    C7282 CHEMICAL ROOM VENTILATION CONTACTOR
      FE7291 BOOSTER PUMP STATION FLOW METER NO. 1 LOWER PRESSURE ZONE
      FIQ7291A FLOW INDICATOR/TOTALIZER
      FT7291B FLOW TRANSMITTER
      PIT7291 PRESSURE TRANSMITTER
      FE7292 BOOSTER PUMP STATION FLOW METER NO. 2 LOWER PRESSURE ZONE
      FIQ7292A FLOW INDICATOR/TOTALIZER
      FT7292B FLOW TRANSMITTER
      PIT7292 PRESSURE TRANSMITTER
      FE7293 BOOSTER PUMP STATION FLOW METER NO. 3 UPPER PRESSURE ZONE
      FIQ7293A FLOW INDICATOR/TOTALIZER
      FT7293B FLOW TRANSMITTER
      PIT7293 PRESSURE TRANSMITTER
    AE7294 CHLORINE RESIDUAL ANALYZER
    AE7295 CHLORINE RESIDUAL ANALYZER
    FS7299 STATION FLOOD ALARM

7300 GENERATOR ROOM
  EG7310 EMERGENCY POWER ENGINE GENERATOR
    PNL7310 ENGINE GENERATOR CONTROL PANEL
  EF7350 GENERATOR ROOM EXHAUST FAN
    TS7350 TEMPERATURE SWITCH
    D7350 INTAKE DAMPER
  MEE7376 AUTOMATIC TRANSFER SWITCH

7400 CHEMICAL ROOM
  MME7411 HYPOCHLORITE SOLUTION METERING PUMP LOWER PRESSURE ZONE RESERVOIR
  MME7412 HYPOCHLORITE SOLUTION METERING PUMP LOWER PRESSURE ZONE PUMPS
  MME7413 HYPOCHLORITE SOLUTION METERING PUMP UPPER PRESSURE ZONE PUMPS
  EF7450 CHEMICAL ROOM EXHAUST FAN
    D7450A INTAKE DAMPER
    D7450B DISCHARGE DAMPER
  TS7498 LOW TEMPERATURE SWITCH

7500 RESTROOM
  IWH7501 INSTANTANEOUS WATER HEATER

EQUIPMENT PREFIXES - THE FOLLOWING EQUIPMENT PREFIXES WILL BE USED THROUGHOUT THE PROJECT.

AE = ANALYTICAL EQUIPMENT
C = CONTACTOR
CB = CIRCUIT BREAKER
CFR = CHEMICAL FEEDER
CH = CABINET HEATER
CV = CONTROL VALVE
D = DAMPER
ECB = ENCLOSED CIRCUIT BREAKER
EF = EXHAUST FAN
EG = ENGINE GENERATOR
FDS = FUSED DISCONNECT SWITCH
FE = FLOW ELEMENT
FIQ = FLOW INDICATOR/TOTALIZER
FL = FLOW SWITCH
FS = FLOAT OR LEVEL SWITCH
FT = FLOW TRANSMITTER
FY = SIGNAL CONVERTER
IL = INSTRUMENT LOOP
IP = INSTRUMENT PANEL
M = MOTOR
MCC = MOTOR CONTROL CENTER
MEE= MISCELLANEOUS ELECTRICAL EQUIPMENT
MIE = MISCELLANEOUS INSTRUMENTATION EQUIPMENT
MME = MISCELLANEOUS MECHANICAL EQUIPMENT
P = PUMP
PIT = PRESSURE INDICATOR/TRANSMITTER
PNL = PANEL
PS = PRESSURE SWITCH
SGR= SUPPLY FAN
SV = SOLENOID FAN
SGR= SWITCHGEAR
SV = SOLENOID VALVE
T = TANK
TFR = TRANSFORMER
TS = TEMPERATURE SWITCH
UH = UNIT HEATER

DESIGN DATA

BOOSTER PUMPS	
LOWER PRESSURE ZONE	2
CAPACITY, GPM	1500
TDH, FEET	60
MOTOR SIZE, HP	50
UPPER PRESSURE ZONE	4
CAPACITY, GPM	1500
TDH, FEET	115
MOTOR SIZE , HP	50
FLOW METER	
NUMBER	3
SIZE, INCHES	2 METERS AT 12 inch 1 METER AT 16 inch
ENGINE GENERATOR	
NUMBER	1
SIZE, KW	300

SA.
ST.
W.
G.
E.
T.
I.
TS.
PP.

REVISION BY DATE

Consultant:
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4664 GOLDEN POND PARK CT.
HOBART, WISCONSIN 54155
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CITY OF OAK CREEK, WISCONSIN

DESIGNED BY	DATE	DRAWN BY	DATE	CHECKED BY	DATE
D.A.M.	7/24/09	R.L.B.	7/24/09	K.A.K.	7/24/09

EQUIPMENT DESIGNATION AND DESIGN DATA
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE
PLAN HOR. N.T.S.
PROFILE HOR. N.T.S.
VER. N.T.S.

SHEET
6
OF
53

00-G-06

INSTRUMENT SOCIETY OF AMERICA INSTRUMENT INDENTIFICATION

	FIRST LETTER(S)		SUCCEEDING LETTERS		
	PROCESS OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSOUT FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
C	USER'S CHOICE			CONTROL	
D	USER'S CHOICE	DIFFERENTIAL	SENSOR (PRIMARY ELEMENT)		
E	VOLTAGE				
F	FLOW RATE	RATIO(FRACTION)			
G	USER'S CHOICE		GLASS, VIEWING DEVICE		
H	HAND				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
K	TIME OR SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MOISTURE				
N	TORQUE		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
O	USER'S CHOICE		ORIFICE, RESTRICTION		
P	PRESSURE (OR VACUUM)		POINT, TEST CONNECTION		
Q	QUANTITY	INTEGRATE			
R	RADIATION		RECORD		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION				
W	WEIGHT, FORCE		WELL		
X	UNCLASSIFIED	X AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE	Y AXIS		RELAY OR COMPUTE	
Z	POSITION, DIMENSION	Z AXIS		DRIVE ACTUATE OR UNCLASSIFIED FINAL CONTROL ELEMENT	

P&ID SYMBOLS (TYPICAL)

Q (A, B, TRS, W–X–Y–Z, C, (N))

A: DESCRIPTION, TOP LINE

B: DESCRIPTION, BOTTOM LINE

TRS: FIRST LETTER(S) AND SUCCEEDING LETTERS OF INSTRUMENT IDENTIFICATION, REFER TO ISA TABLE

W: UNIT PROCESS NUMBER

X: LOOP NUMBER

Y: UNIT NUMBER, USED FOR MULTIPLE SETS WITH THE SAME X-Y DESIGNATION

Z: SET NUMBER, USED FOR MULTIPLE SETS OF UNITS WITH THE SAME W-X-Y DESIGNATION

N: NUMBER OF UNITS

C: INSTALLATION REQUIREMENT:
- e.g.: CLASS I, DIVISION 1 HAZARDOUS LOCATION
- i.s.: INTRINSICALLY SAFE, INSTALLED IN CLASS I, DIVISION 1 HAZARDOUS LOCATION

O: PROVISION REQUIREMENT:
- * EXISTING, RE-USED EQUIPMENT
- ** EQUIPMENT SPECIFIED UNDER DIVISION 11, 13, OR 15
- *** FUTURE EQUIPMENT
- BLANK: EQUIPMENT SPECIFIED UNDER DIVISION 16

FIELD DEVICE

CONTROL PANEL DEVICE, FRONT-OF-PANEL, NORMALLY ACCESSIBLE

CONTROL PANEL DEVICE, BACK-OF-PANEL, NOT NORMALLY ACCESSIBLE

MCC DEVICE, FRONT-OF-PANEL, NORMALLY ACCESSIBLE

MCC DEVICE, BACK-OF-PANEL, NOT NORMALLY ACCESSIBLE

SOFTWARE DEVICE OR FUNCTION, NORMALLY ACCESSIBLE

SOFTWARE DEVICE OR FUNCTION, NOT NORMALLY ACCESSIBLE

SOFTWARE ALARM FUNCTION, NORMALLY ACCESSIBLE

INTERLOCK FUNCTION, REFER TO SPECIFICATIONS

XX (Y) PROGRAMMABLE LOGIC CONTROLLER INPUT/OUTPUT POINT WHERE Y=QUANTITY AND XX
- DI: DIGITAL INPUT
- DI: DIGITAL OUTPUT
- AI: ANALOG INPUT
- AO: ANALOG OUTPUT

XX (Y) NETWORK (DEVICENET, ETC) CONTROL SYSTEM INPUT/OUTPUT POINT WHERE Y=QUANTITY AND XX
- DI: DIGITAL INPUT
- DI: DIGITAL OUTPUT
- AI: ANALOG INPUT
- AO: ANALOG OUTPUT

NON-CONNECTING LINES

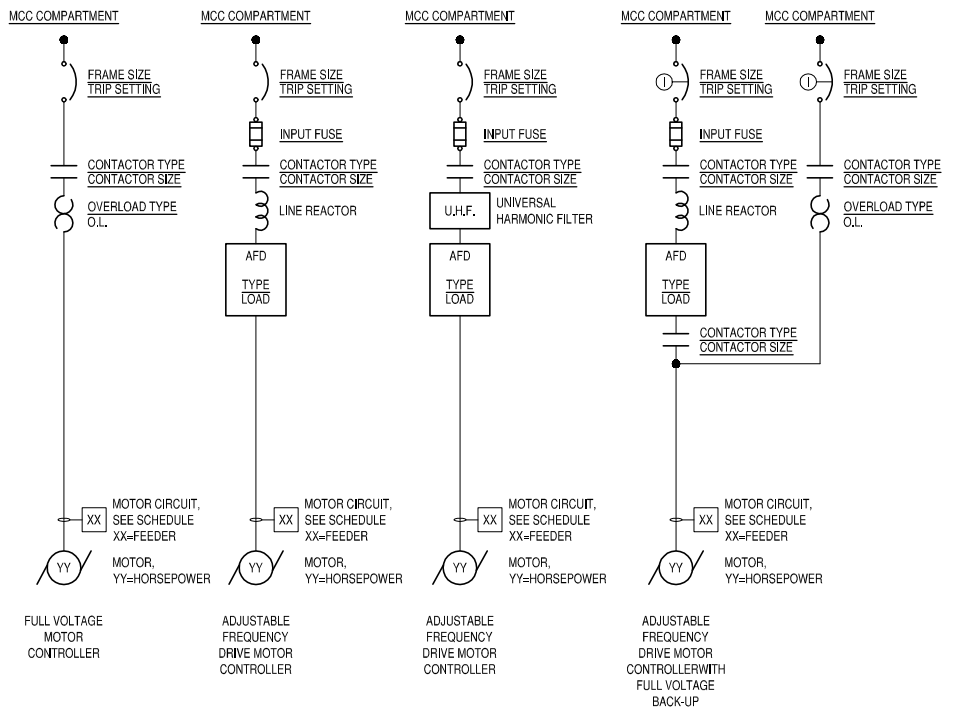
CONNECTING LINES

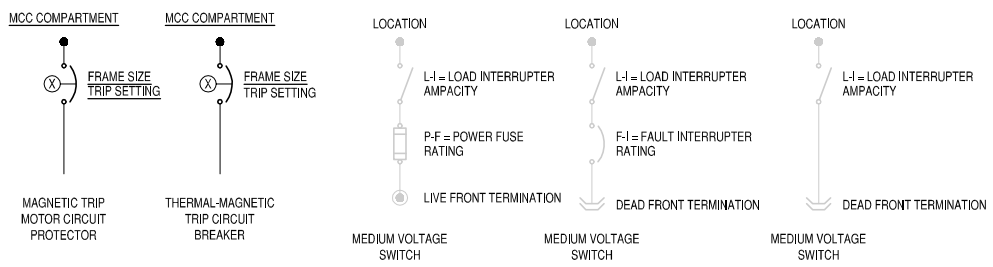
(2) PARALLEL LINES (PARENTHETICAL NUMBER INDICATES THE NUMBER OF SIGNALS REPRESENTED)

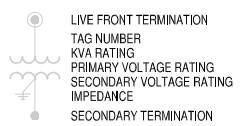
MS XX FULL VOLTAGE MOTOR CONTROLLER, XX INDICATES LOCATION

XX / YY MOTOR CONTROLLER, XX INDICATES TYPE OF CONTROLLER AND YY INDICATES LOCATION

MOTOR CONTROL CENTER (MCC) SYMBOLS







WIRING & CONDUIT

1. (X) #12 & #12G

   REFERS TO NUMBER OF WIRE(S) AND SIZE OF WIRE(S) REQUIRED, WHERE AS:

   (1) = ONE WIRE
   #12 = THE SIZE OF WIRE REQUIRED
   G = GROUND WIRE

2. (X) 1-1/2"C

   REFERS TO NUMBER OF CONDUIT(S) AND SIZE OF CONDUIT(S) REQUIRED, WHERE AS:

   (1) = ONE CONDUIT
   1-1/2"C = THE SIZE OF CONDUIT REQUIRED

Ax = 2C#16 SHIELDED, TWISTED PAIR CABLE

Dx = #14 THHN WIRE (x = NUMBER OF WIRES)

Mx = 1" CONDUIT FOR CABLE SUPPLIED BY MANUFACTURER BY MFG. (x=NUMBER OF CONDUITS)

* REFER TO DRAWINGS FOR REQ'D WIRE AND CONDUIT SIZES AND AMOUNTS

GENERAL NOTES:

1. THIS DRAWING IS A STANDARD LEGEND. SYMBOLS SHOWN MAY NOT ALL APPEAR ON DRAWINGS FOR THIS PROJECT.
2. ALL CONTACTS ARE SHOWN IN THE DE-ENERGIZED (SHELF) POSITION. BI-STABLE RELAYS ARE SHOWN IN THE RESET POSITION.
3. ONE-LINE DIAGRAMS FOR POWER SWITCHGEAR, USE ANSI STANDARD SYMBOLS AND ABBREVIATIONS.
4. SEE INSTRUMENTATION DRAWINGS FOR INSTRUMENTATION SYMBOLS AND DETAILS.
5. OTHER ABBREVIATIONS PER ANSI Z32.13 AND ISA S5.1
6. ELEVATIONS ADJACENT TO SYMBOLS ARE BASED ON STATION DATUM. HEIGHTS ADJACENT TO SYMBOLS (+4.0) ARE REFERENCED TO FINISHED FLOOR GRADE.
7. THE LETTERS "GFI" ADJACENT TO A RECEPTACLE INDICATES A GROUND FAULT INTERRUPTER FEED-THROUGH RECEPTACLE ASSEMBLY. THE LETTERS ADJACENT TO A PANELBOARD CIRCUIT BREAKER INDICATES A GROUND FAULT CIRCUIT BREAKER. THE LETTERS "IG" INDICATE AN ISOLATED GROUND RECEPTACLE. PROVIDE SEPARATE GROUND WIRE.
8. SEE SPECIFICATIONS AND SCHEDULES FOR COMPONENT REQUIREMENTS FOR MOTOR CONTROLLERS AND FOR CONTACTORS.

LINETYPE LEGEND

- SOFTWARE SIGNAL/FUNCTION
- ANALOG SIGNAL, 4-20mADC OR PULSE FREQUENCY (A)
- PULSE FREQUENCY (PF)
- DISCRETE SIGNAL, DRY CONTACT
- MANUFACTURER'S SIGNAL (M)
- PNEUMATIC SIGNAL
- MAJOR PROCESS
- MINOR PROCESS

PROCESS NOTES:

1. SIZE CONDUIT PER NEC. MINIMUM SIZE 3/4".
2. PROVIDE SEPARATE CONDUITS FOR THE FOLLOWING:
   a. 4-20mADC
   b. 120 VOLT CONTROL
   c. 120 VOLT POWER
   d. 480 VOLT POWER
   e. LOW VOLTAGE INSTRUMENTATION
   f. COMMUNICATION
3. REFER TO SPECIFICATION 16900 FOR DETAILS ON VARIOUS LOOP FUNCTIONS AS WELL AS DETAILS REGARDING OPERATOR INTERFACE FUNCTIONS.
4. REFER TO DIVISION 11000, 13000, 15000 FOR ADDITIONAL DETAILS REGARDING INSTRUMENTATION AND CONTROL EQUIPMENT FURNISHED UNDER THOSE SPECIFICATIONS.
5. (1) 1-1/2"C REFERS TO NUMBER OF WIRES AND SIZE OF WIRE REQUIRED, WHERE AS:
   (1) = ONE WIRE
   1-1/2"C = THE SIZE OF WIRE REQUIRED

ELECTRICAL ABBREVIATIONS

AFD	ADJUSTABLE FREQUENCY DRIVE	EM	EMERGENCY	KVA	KILOVOLT-AMPERES	PC	PHOTO CONTROL
AFG	ABOVE FINISH GRADE	EP	CLASS 1, DIV. 1 EQUIPMENT	KW	KILOWATTS	PFR	PHASE FAIL RELAY
AHU	AIR HANDLING UNIT	EUH	ELECTRIC UNIT HEATER	MAU	MAKE-UP AIR UNIT	PVC	POLYVINYL CHLORIDE
AUTO	AUTOMATIC	EWC	ELECTRIC WATER COOLER	M.C.	MECHANICAL CONTRACTOR	REQ'D	REQUIRED
AUX	AUXILIARY	EWH	ELECTRIC WALL HEATER	MCC	MOTOR CONTROL CENTER	SPEC	SPECIFICATION
AWG	AMERICAN WIRE GAUGE	FBO	FURNISHED BY OTHERS	MFR	MANUFACTURER	SPD	160KA/PHASE MINIMUM SURGE PROTECTIVE DEVICE
BKR	BREAKER	G	GROUND	MS-AUX	MOTOR STARTER AUXILIARY	SS	STAINLESS STEEL
C	CONDUIT	G.C.	GENERAL CONTRACTOR	mA	MILLIAMPERE	TC	7 DAY TIMECLOCK PROVIDED BY ELECTRICAL CONTRACTOR
CB	CIRCUIT BREAKER	GFI	GROUND FAULT INTERRUPTER	mV	MILLIVOLT	TYP	TYPICAL
CKT	CIRCUIT	GND	GROUND	MOD	MOTOR OPERATED DAMPER	UH	UNIT HEATER
CU	COPPER	HVAC	HEATING, VENTILATING & AIR CONDITIONING	NL	NIGHTLIGHT	UPS	UNINTERRUPTIBLE POWER SUPPLY
DISC	DISCONNECT	HTR	HEATER	N.O.	NORMALLY OPEN	W/	WITH
E.C.	ELECTRICAL CONTRACTOR	I.S.	INTRINSICALLY SAFE	N.C.	NORMALLY CLOSED	WH	WATER HEATER
ECB	ENCLOSED CIRCUIT BREAKER	I/O	INPUT/OUTPUT	NF	NON-FUSED	WP	WEATHER PROOF
EDH	ELECTRIC DUCT HEATER	IG	ISOLATED GROUND	NTS	NOT TO SCALE	XFMR	TRANSFORMER
EF	EXHAUST FAN	J-BOX	JUNCTION BOX	O.L.	OVERLOAD	XLP	CROSS LINKED POLYETHYLENE
ELEV	ELEVATION	KCMIL	THOUSAND CIRCULAR MILS	OHD	OVER HEAD DOOR		
		KV	KILOVOLTS				

SA. ST. W. G. E. T. I. TS. PP.

Consultant:
Robert E. Lee & Associates, Inc.
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HOBART, WISCONSIN 54155
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FAX: 920-662-9141
WWW.RELEEINC.COM

REVISION BY DATE

CITY OF OAK CREEK, WISCONSIN

DESIGNED BY	DATE	DRAWN BY	DATE	CHECKED BY	DATE
D.A.M.	8/13/09	R.L.B.	8/13/09	K.A.K.	8/13/09

ELECTRICAL SYMBOLS AND ABBREVIATIONS
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	7
PROFILE HOR. N.T.S. VER. N.T.S.	OF 53

00-E-01

File: R:\4900\4931\4931001\dwg\ELECTRICAL SYMBOLS.dwg
Date: Dec 01, 2009 - 2:56pm
LAYOUT: LAYOUT
PLAN VIEW: PLAN

BENCHMARK	BENCHMARK ESTABLISHED BY: ROBERT E. LEE & ASSOCIATES, INC. **FIELD VERIFY BENCHMARKS FOR ACCURACY.**	
NO.	DESCRIPTION	ELEV.
1	TOP NUT ON THE FIRE HYDRANT	194.61
2	TOP NUT ON THE FIRE HYDRANT	197.86
3	TOP NUT ON THE FIRE HYDRANT	191.02

NORTH

0' 20' 40'

SCALE IN FEET

UTILITY INFORMATION:

UTILITIES PRESENT:
PRIOR TO CONSTRUCTION, CONTACT DIGGERS HOTLINE FOR EXACT LOCATIONS OF UNDERGROUND UTILITIES

DIGGERS HOTLINE = 1-800-242-8511

DEMOLITION NOTES

1. EXISTING ASPHALT AND BASE COURSE MAY BE PULVERIZED AND STOCKPILED ON SITE FOR FUTURE USE.
2. EXISTING GAS, ELECTRIC, CABLE TELEVISION AND TELEPHONE TO BE REMOVED AND/OR RELOCATED. ALL WORK AND ASSOCIATED COSTS SHALL BE RESPONSIBILITY OF THE GENERAL CONTRACTOR.

NOTE

1. A MINIMUM OF 6.5 FEET OF COVER SHALL BE MAINTAINED OVER ALL WATERMAIN.
2. FIELD VERIFY LOCATION OF EXISTING UTILITIES. IF EXISTING LOCATIONS DIFFER FROM WHAT IS INDICATED ON THE PLANS, **CONTACT ENGINEER,** PRIOR TO CONTINUED WORK.
3. TO ACQUIRE USGS DATUM FROM CITY DATUM ADD 580.6.
4. ALL UNDERGROUND DUCTILE IRON PIPING SHALL BE POLYETHYLENE WRAPPED WITH TWO LAYERS. ALL UNDERGROUND DUCTILE IRON PIPING WITH BOLTS SHOULD BE WRAPPED WITH THREE LAYERS.
5. ALL VALVES SHALL BE OPERATED BY THE UTILITY.
6. CONTRACT A IS RESPONSIBLE FOR ALL ASPHALT RESTORATION WITHIN PUETZ ROAD RESERVOIR CONSTRUCTION LIMITS.

OUTLOT 1
CSM NO. 6111

OUTLOT 1
CSM NO. 6112

GROUND STORAGE RESERVOIR

" PVC=INV 188.95"

SB # 1= 199.16'

SB # 2 = 196.38'

SB # 3=195.77

RELOCATE EX SPRINKLER HEADS & APPURTENANCES

RELOCATE EX CONC RETAINING WALL
FLAG POLES AND LIGHTS
REMOVE & REPLACE EXISTING SHRUBS & LANDSCAPING WITH SAME

SAWCUT EX. ASPHALT

SAWCUT EX. ASPHALT
PUETZ ROAD RESERVOIR CONSTRUCTION LIMITS (TYP.)
REMOVE BENCH

RELOCATE EX SPRINKLER HEAD & APPURTENANCES (TYP. OF 5)

RELOCATE EX ELECTRIC

REMOVE EX. LIGHT POLE & BASE
USE POLE FOR CAMERAS

REMOVE TREE
REMOVE CONC.
RELOCATE EX MONUMENT
REMOVE ASPHALT
SAWCUT EX. ASPHALT

RELOCATE EX. LIGHT & CORRESPONDING ELECTRICAL

SOUTH BREABURN DRIVE

WEST ORCHARD WAY

EX SAN MH
RIM 183.57
INV. 170.53
D = 13.04'

EX SAN MH
RIM 192.09
INV. 181.07
D = 11.02'

SA.	Consultant: Robert E. Lee & Associates, Inc.	CITY OF OAK CREEK, WISCONSIN			APPROVED BY UTILITY ENGINEER DATE
ST.		DESIGNED BY DATE	DRAWN BY DATE	CHECKED BY DATE	APPROVED BY CITY ENGINEER DATE
W.		D.A.M. 8/13/09	R.L.B. 8/13/09	K.A.K. 8/13/09	
G.	ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES	EXISTING SITE AND SITE DEMOLITION PLAN IN: PUETZ ROAD BOOSTER STATION			SCALE: PLAN HOR. 1"=20' PROFILE HOR. N.T.S. VER. N.T.S.
E.					SHEET: 8 OF 53
T.					
I.					
TS.					
PP.					
	4664 GOLDEN POND PARK CT. HOBART, WISCONSIN 54155 PHONE: 920-662-9641 FAX: 920-662-9141 WWW.RELEEINC.COM				
	REVISION BY DATE	FILE NO: 08101			05-D-01

File: P:\14000\14051\14051101\dwg\14051010.dwg
Plot Date: Sep 01, 2009 - 2:16pm
LAYOUT: LAYOUT
PLAN VIEW: PLAN

BENCHMARK	BENCHMARK ESTABLISHED BY: ROBERT E. LEE & ASSOCIATES, INC. **FIELD VERIFY BENCHMARKS FOR ACCURACY.**	
NO.	DESCRIPTION	ELEV.
1	TOP NUT ON THE FIRE HYDRANT	194.61
2	TOP NUT ON THE FIRE HYDRANT	197.86
3	TOP NUT ON THE FIRE HYDRANT	191.02

NORTH

0' 20' 40'

SCALE IN FEET

UTILITY INFORMATION:

UTILITIES PRESENT:
PRIOR TO CONSTRUCTION, CONTACT DIGGERS HOTLINE FOR EXACT LOCATIONS OF UNDERGROUND UTILITIES

DIGGERS HOTLINE = 1-800-242-8511

NOTE

1. A MINIMUM OF 6.5 FEET OF COVER SHALL BE MAINTAINED OVER ALL WATERMAIN.
2. FIELD VERIFY LOCATION OF EXISTING UTILITIES. IF EXISTING LOCATIONS DIFFER FROM WHAT IS INDICATED ON THE PLANS, **CONTACT ENGINEER,** PRIOR TO CONTINUED WORK.
3. TO ACQUIRE USGS DATUM FROM CITY DATUM ADD 580.6.
4. ALL UNDERGROUND DUCTILE IRON PIPING SHALL BE POLYETHYLENE WRAPPED WITH TWO LAYERS. ALL UNDERGROUND DUCTILE IRON PIPING WITH BOLTS SHOULD BE WRAPPED WITH THREE LAYERS.
5. ALL VALVES SHALL BE OPERATED BY THE UTILITY.
6. CONTRACT A IS RESPONSIBLE FOR ALL ASPHALT RESTORATION WITHIN PUETZ ROAD RESERVOIR CONSTRUCTION LIMITS.

OUTLOT 1
CSM NO. 6111

OUTLOT 1
CSM NO. 6112

GROUND STORAGE RESERVOIR

PUETZ ROAD RESERVOIR CONSTRUCTION LIMITS (TYP.)

TRANSFORMER PAD CONTRACT A

24" COUPLING (CONTRACT B)

CONTRACT B | CONTRACT A

PATHWAY (TYP.) SEE DETAIL SHEET 200-AS-04

PAVEMENT SEE DETAIL SHEET 200-AS-04

22.5° BEND

RELOCATED CONC RETAINING WALL
FLAG POLES AND LIGHTS
REPLACED SHRUBS & LANDSCAPING

24" BUTTERFLY VALVES

LATERAL INV. 192.50

20" COUPLING (CONTRACT B)

CONTRACT A
CONTRACT B

15' - 6" HYDRANT LEAD
20" x 20" x 6" ANCHOR TEE
20" BUTTERFLY VALVE
6" GATE VALVE
HYDRANT

CLEAN-OUT (TYP.)

4" SAN LATERAL W/ CLEANOUT

LATERAL INV. 181.1

24" SOLID SLEEVE

EX SAN MH
RIM 183.57
INV. 170.53
D = 13.04'

WEST ORCHARD WAY

EX SAN MH
RIM 192.09
INV. 181.07
D = 11.02'

24" COUPLING (CONTRACT B)

RELOCATED MONUMENTS

RELOCATED SPRINKLER HEADS (TYP.)

24" TEES

PATHWAY PAVEMENT, MATCH EXISTING WIDTH

45° BEND

SOUTH BREABURN DRIVE

1" PVC=INV 188.95'

File: 81-M901,M921,M931(1).dwg M931001D.dwg
Plot Date: Sep 01, 2009 - 2:16pm

PLAN VIEW: PLAN LAYOUT: LAYOUT

SA.	Consultant: Robert E. Lee & Associates, Inc.	CITY OF OAK CREEK, WISCONSIN	APPROVED BY UTILITY ENGINEER DATE
ST.			
W.			
G.			
E.	ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES	DESIGNED BY DATE: D.A.M. 8/13/09 | DRAWN BY DATE: R.L.B. 8/13/09 | CHECKED BY DATE: K.A.K. 8/13/09	APPROVED BY CITY ENGINEER DATE
T.		SITE AND YARD PIPING PLAN	SCALE: PLAN HOR. 1"=20' / PROFILE HOR. N.T.S. VER. N.T.S.
I.		IN: PUETZ ROAD BOOSTER STATION	SHEET: 9 OF 53
TS.	4664 GOLDEN POND PARK CT. HOBART, WISCONSIN 54155 PHONE: 920-662-9541 FAX: 920-662-9141 WWW.RELEEINC.COM		
PP.			
	REVISION BY DATE	FILE NO: 08101	05-C-01

BENCHMARK	BENCHMARK ESTABLISHED BY: ROBERT E. LEE & ASSOCIATES, INC. **FIELD VERIFY BENCHMARKS FOR ACCURACY.**	
NO.	DESCRIPTION	ELEV.
1	TOP NUT ON THE FIRE HYDRANT	194.61
2	TOP NUT ON THE FIRE HYDRANT	197.86
3	TOP NUT ON THE FIRE HYDRANT	191.02

NORTH

0' 20' 40'

SCALE IN FEET

OUTLOT 1
CSM NO. 6111

GROUND STORAGE RESERVOIR

OUTLOT 1
CSM NO. 6112

" PVC=INV 188.95"

PUETZ ROAD RESERVOIR CONSTRUCTION LIMITS (TYP.)

PROPOSED SILT FENCE (TYP.)

SPRINKLER HEADS (TYP.)

WEST ORCHARD WAY

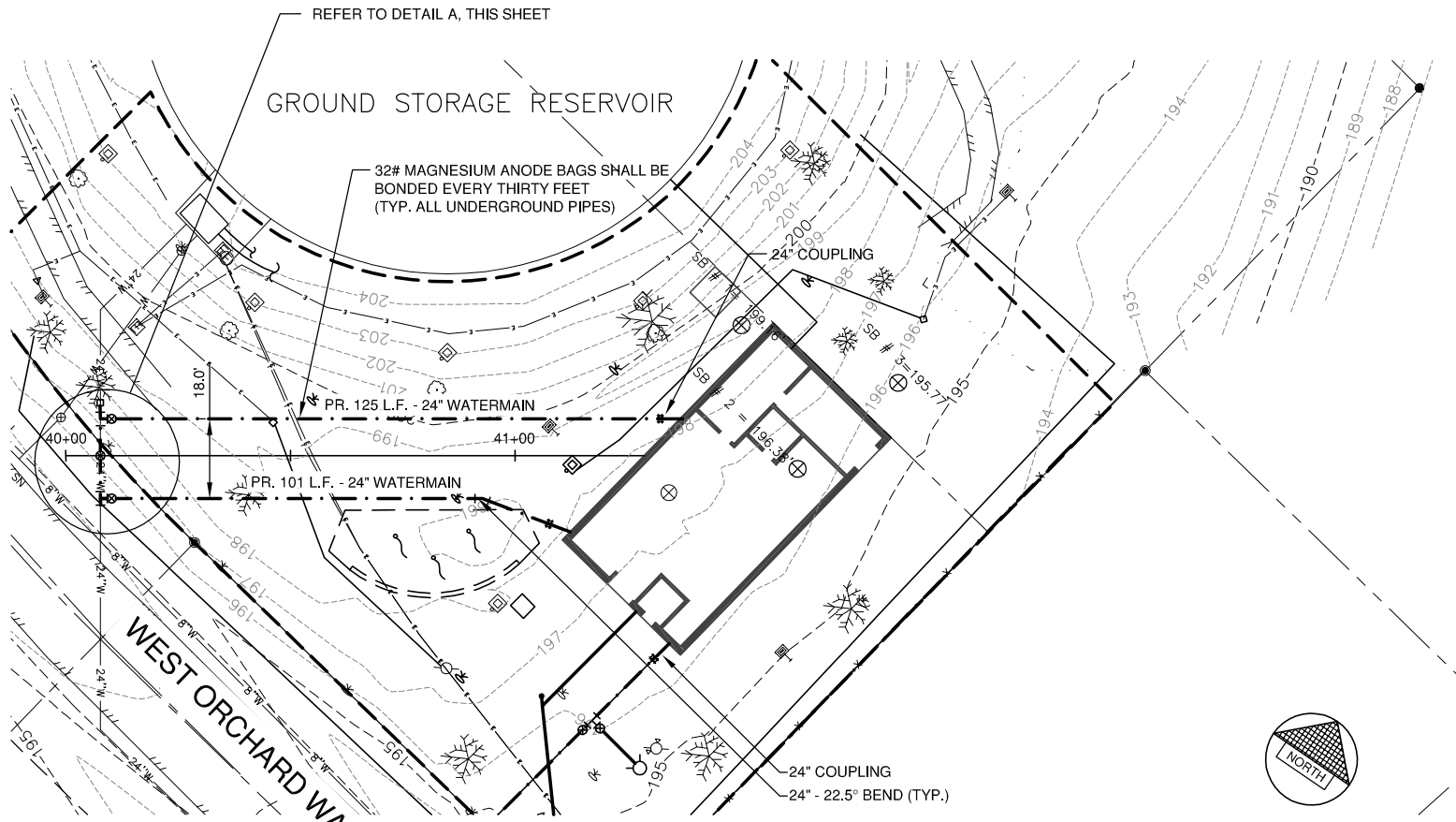
SOUTH BREABURN DRIVE

EX SAN MH
RIM 183.57
INV. 170.53
D = 13.04'

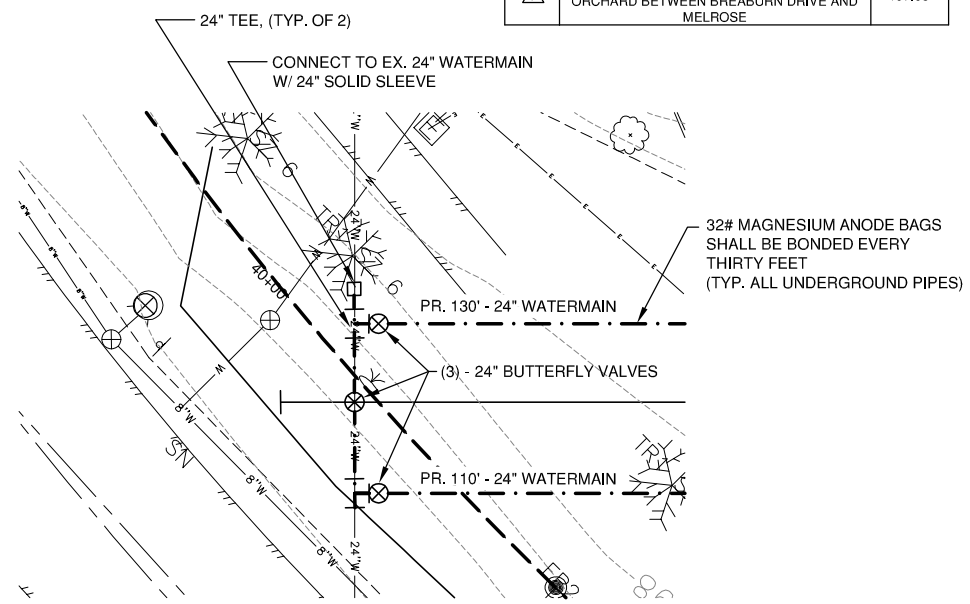
EX SAN MH
RIM 192.09
INV. 181.07
D = 11.02'

File: R:\MKE\L\08101_VEG\10010.dwg
Plot Date: Sep 01, 2009 - 2:15pm
LAYOUT:
PLAN VIEW: PLAN

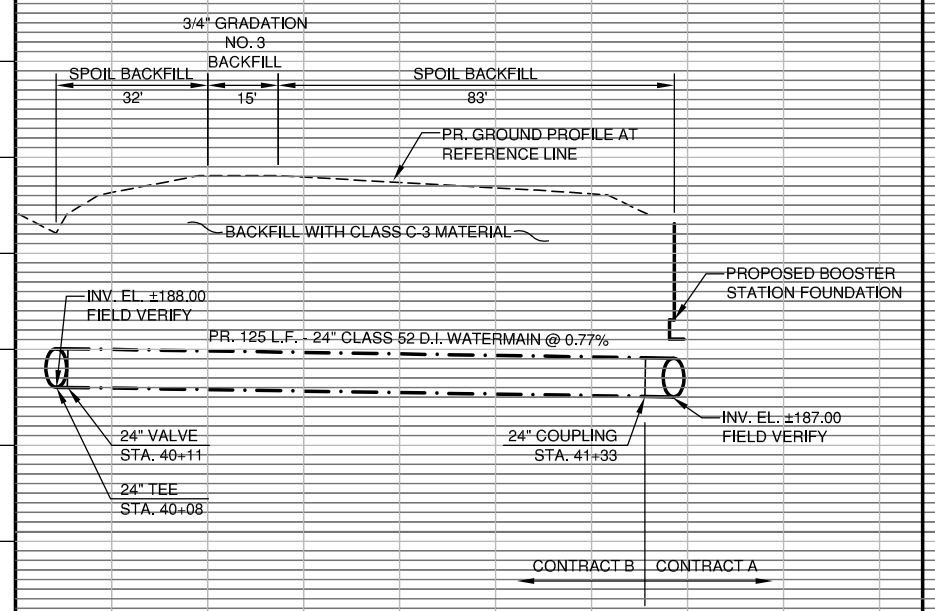
SA.	Consultant: Robert E. Lee & Associates, Inc.	CITY OF OAK CREEK, WISCONSIN			APPROVED BY
ST.					UTILITY ENGINEER DATE
W.		DESIGNED BY DATE	DRAWN BY DATE	CHECKED BY DATE	APPROVED BY
G.		D.A.M. 8/13/09	R.L.B. 8/13/09	K.A.K. 8/13/09	CITY ENGINEER DATE
E.	ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES	GRADING AND EROSION CONTROL PLAN			SCALE / SHEET
T.		IN: PUETZ ROAD BOOSTER STATION			PLAN HOR. 1"=20' / 10
I.					PROFILE HOR. N.T.S. / OF
TS.	4664 GOLDEN POND PARK CT. HOBART, WISCONSIN 54155 PHONE: 920-662-9541 FAX: 920-662-9141 WWW.RELEEINC.COM				VER. N.T.S. / 53
PP.					
	REVISION BY DATE	FILE NO: 08101			05-C-02

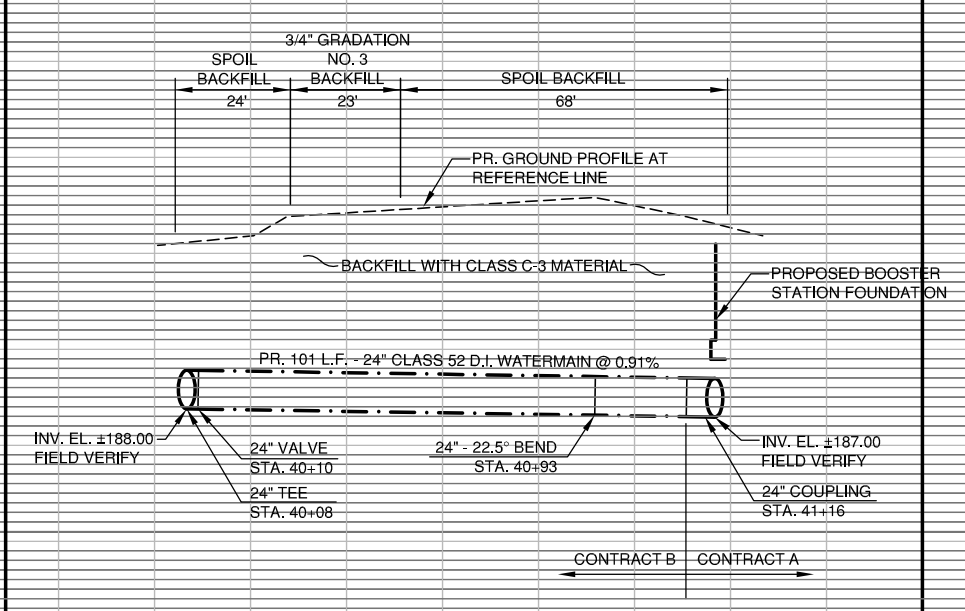


BENCHMARK	BENCHMARK ESTABLISHED BY: ROBERT E. LEE & ASSOCIATES, INC. FIELD VERIFY BENCHMARKS FOR ACCURACY.	
NO.	DESCRIPTION	ELEV.
1	BIG OUTLET ON HYD., NORTH SIDE OF ORCHARD BETWEEN BREABURN DRIVE AND MELROSE	197.86'



NOTE:
1. BUILDING CONTRACTOR SHALL MAKE FINAL CONNECTION TO WATER MAIN AT FLEXIBLE COUPLINGS.
2. CONTRACTOR SHALL ATTACH ANNODE BAGS @ 30' INTERVALS ALONG ENTIRE PIPELINE LENGTH.
3. CONTINUOUS ELECTRICAL CONDUCTIVITY SHALL BE PROVIDED ON THE WATERMAIN BY USE OF THE CABLE BONDING SYSTEM (AWG #2 MIN.)
4. ALL WATERMAIN SHALL INCLUDE BLUE #10 TRACER WIRE LOOPED AT HYDRANTS AND AS NOTED ON THE PLANS IN A TRACER WIRE ACCESS BOX. TRACER WIRE ENDS SHALL BE BONDED TO 8' COPPER GROUND ROD.
5. ALL UNDERGROUND PIPING SHALL BE CONSTRUCTED WITHIN ROAD R.O.W.





BID ITEM NUMBERS	ESTIMATE OF QUANTITIES
2	24" D.I. WATERMAIN, BACKFILL, SURF. REST..... 226 L.F.
4	24" BUTTERFLY VALVE..... 3 EA.

SA. ST. W. G. E. T. I. TS. PP.

Consultant:
Robert E. Lee & Associates, Inc.
ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES
4664 GOLDEN POND PARK CT.
HOBART, WISCONSIN 54155
PHONE: 920-662-9641
FAX: 920-662-9141
WWW.RELEEINC.COM

REVISION BY | DATE

CITY OF OAK CREEK, WISCONSIN

DESIGNED BY	DATE	DRAWN BY	DATE	CHECKED BY	DATE
D.A.M.	8/13/09	R.L.B.	8/13/09	K.A.K.	8/13/09

PROPOSED WATERMAIN
STA. 40+00 TO STA. 41+28

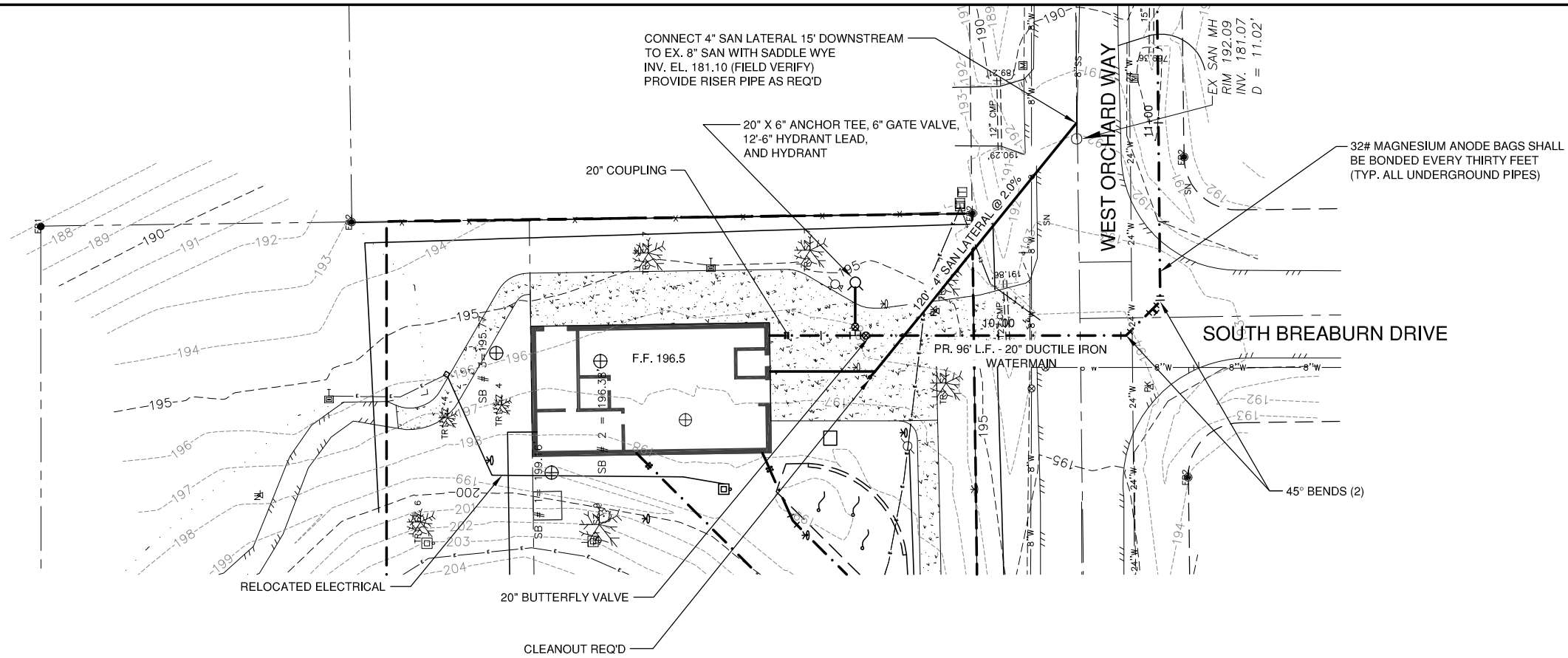
FILE NO: 08101

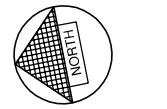
APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. 1"=20'	11
PROFILE HOR. 1"=20' VER. 1"=5'	OF 53

05-C-03

File: R:\08101\431\101\Layout\PLAN-WATERMAIN-NORTH-SOUTH.dwg
Plot Date: Sep 01, 2009 - 2:19pm
PLAN: PLAN1
LAYOUT: NORTH-SOUTH-WM
PROFILE: PROFILE1

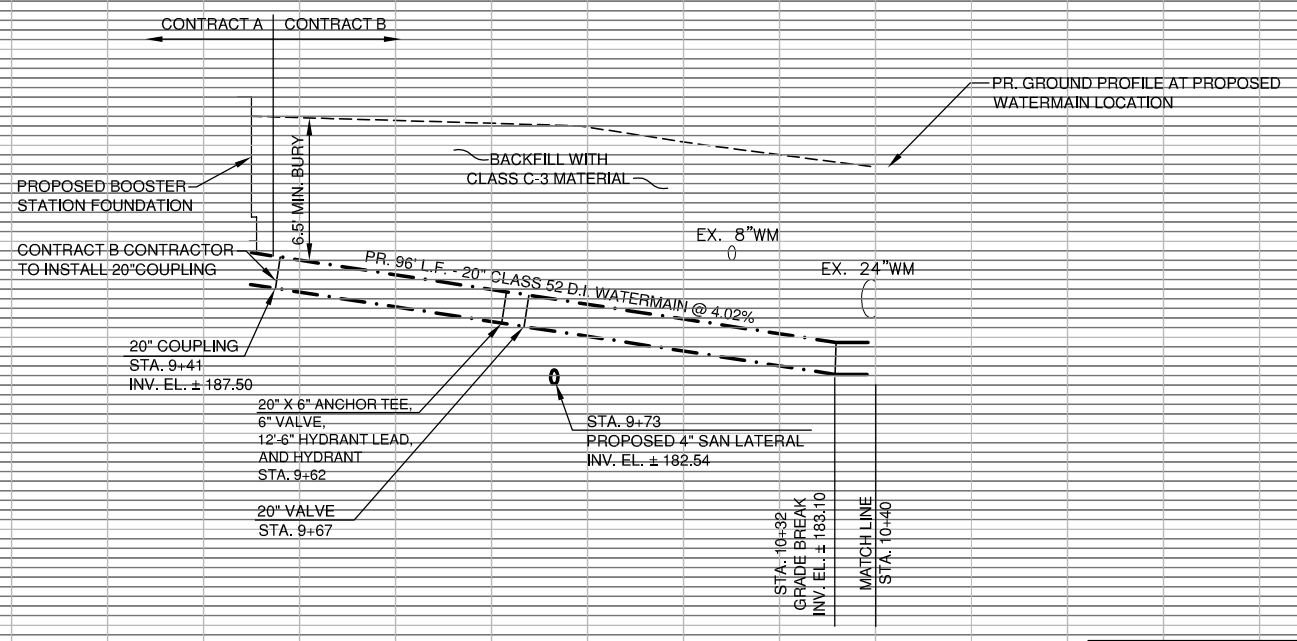




0' 20' 40'

SCALE IN FEET

NOTE:
1. BUILDING CONTRACTOR SHALL MAKE FINAL CONNECTION TO WATER MAIN AT FLEXIBLE COUPLINGS.
2. CONTRACTOR SHALL ATTACH ANNODE BAGS @ 30' INTERVALS ALONG ENTIRE PIPELINE LENGTH.
3. CONTINUOUS ELECTRICAL CONDUCTIVITY SHALL BE PROVIDED ON THE WATERMAIN BY USE OF THE CABLE BONDING SYSTEM (AWG #2 MIN.)
4. ALL WATERMAIN SHALL INCLUDE BLUE #10 TRACER WIRE LOOPED AT HYDRANTS AND AS NOTED ON THE PLANS IN A TRACER WIRE ACCESS BOX. TRACER WIRE ENDS SHALL BE BONDED TO 8' COPPER GROUND ROD.
5. ALL UNDERGROUND PIPING SHALL BE CONSTRUCTED WITHIN ROAD R.O.W.



BID ITEM NUMBERS	ESTIMATE OF QUANTITIES
1	20" D.I. WATERMAIN, BACKFILL, SURF. REST..... 96 L.F.
3	20" BUTTERFLY VALVE AND BOX..... 1 EA.
6	6" GATE VALVE AND BOX..... 1 EA.
7	HYDRANT..... 1 EA.
8	6" D.I. HYDRANT LEAD..... 12 L.F.
9	4" SANITARY SEWER LATERAL..... 120 L.F.

SA.
ST.
W.
G.
E.
T.
I.
TS.
PP.

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4664 GOLDEN POND PARK CT.
HOBART, WISCONSIN 54155
PHONE: 920-662-9641
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WWW.RELEEINC.COM

REVISION BY DATE

CITY OF OAK CREEK, WISCONSIN

DESIGNED BY DATE	DRAWN BY DATE	CHECKED BY DATE
D.A.M. 8/13/09	R.L.B. 8/13/09	K.A.K. 8/13/09

PROPOSED WATERMAIN & SAN. LAT.
WEST ORCHARD WAY
STA. 9+35 TO STA. 10+48

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. 1"=20'	12
PROFILE HOR. 1"=20' VER. 1"=5'	OF 53

05-C-04

File: R:\08101\08101\Dwg\X_ORCHARD WAY.dwg
Plot Date: Sep 01, 2009 - 2:18pm
PLAN: PLAN1
LAYOUT: WEST ORCHARD WAY WATERMAIN
PROFILE: PROFILE1

BENCHMARK	BENCHMARK ESTABLISHED BY: ROBERT E. LEE & ASSOCIATES, INC. **FIELD VERIFY BENCHMARKS FOR ACCURACY.**	
NO.	DESCRIPTION	ELEV.
1	"OPEN" ON HYD, WEST SIDE OF BREABURN DRIVE, SOUTH OF ORCHARD	191.02'
2	BIG OUTLET ON HYD., NORTH SIDE OF ORCHARD BETWEEN BREABURN DRIVE AND MELROSE	197.86'

BID ITEM NUMBERS	ESTIMATE OF QUANTITIES
1	20" D.I. WATERMAIN, BACKFILL, SURF. REST..... 390 L.F.
3	20" BUTTERFLY VALVE AND BOX..... 1 EA.
5	16" BUTTERFLY VALVE AND BOX..... 1 EA.

NOTE:
1. BUILDING CONTRACTOR SHALL MAKE FINAL CONNECTION TO WATER MAIN AT FLEXIBLE COUPLINGS.
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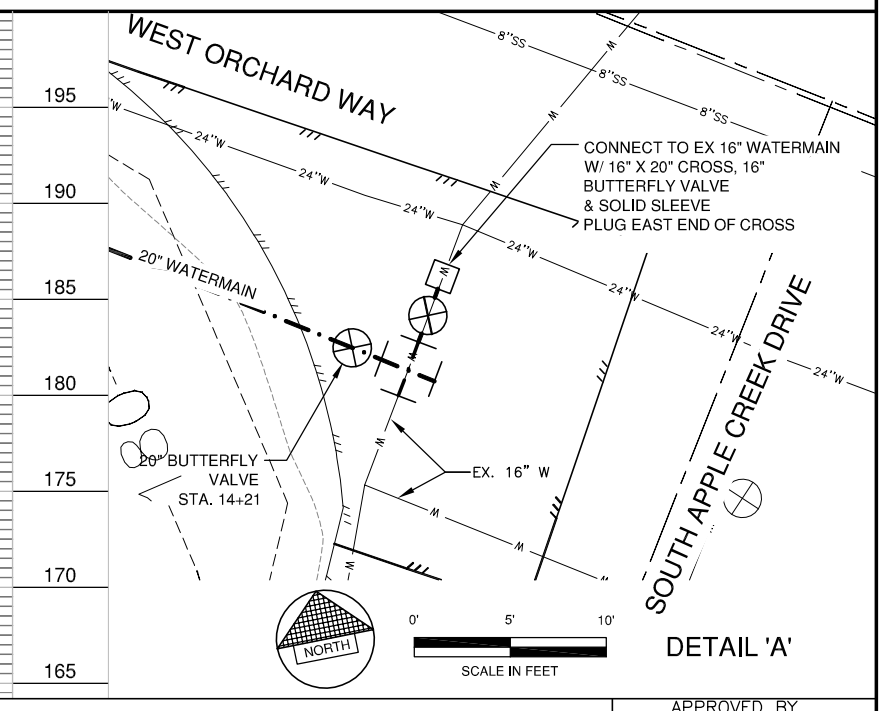
3. CONTINUOUS ELECTRICAL CONDUCTIVITY SHALL BE PROVIDED ON THE WATERMAIN BY USE OF THE CABLE BONDING SYSTEM (AWG #2 MIN.)
4. ALL WATERMAIN SHALL INCLUDE BLUE #10 TRACER WIRE LOOPED AT HYDRANTS AND AS NOTED ON THE PLANS IN A TRACER WIRE ACCESS BOX. TRACER WIRE ENDS SHALL BE BONDED TO 8' COPPER GROUND ROD.
5. ALL UNDERGROUND PIPING SHALL BE CONSTRUCTED WITHIN ROAD R.O.W.



DETAIL 'A'

SA.	Consultant: Robert E. Lee & Associates, Inc.	CITY OF OAK CREEK, WISCONSIN	APPROVED BY UTILITY ENGINEER DATE
ST.		DESIGNED BY D.A.M. 8/13/09 / DRAWN BY R.L.B. 8/13/09 / CHECKED BY K.A.K. 8/13/09	APPROVED BY CITY ENGINEER DATE
W.		PROPOSED WATERMAIN WEST ORCHARD WAY STA. 10+48 TO STA. 14+24	SCALE: PLAN HOR. 1"=20', PROFILE HOR. 1"=20', VER. 1"=5' / SHEET: 13 OF 53
G.			
E.	ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES		
T.			
I.	4664 GOLDEN POND PARK CT. HOBART, WISCONSIN 54155 PHONE: 920-662-9641 FAX: 920-662-9141 WWW.RELEEINC.COM		
TS.			
PP.			
	REVISION BY DATE	FILE NO: 08101	05-C-05

File: R:\08101\08101\Dwg\X_ORCHARD WAY.dwg
Plot Date: Sep 01, 2009 - 21:17pm
PLAN: PLAN1
LAYOUT: WEST ORCHARD WAY WATERMAIN
PROFILE: PROFILE1

BENCHMARK	BENCHMARK ESTABLISHED BY: ROBERT E. LEE & ASSOCIATES, INC. **FIELD VERIFY BENCHMARKS FOR ACCURACY.**	
NO.	DESCRIPTION	ELEV.
1	TOP NUT ON THE FIRE HYDRANT	194.61
2	TOP NUT ON THE FIRE HYDRANT	197.86
3	TOP NUT ON THE FIRE HYDRANT	191.02

NORTH

0' 20' 40'

SCALE IN FEET

OUTLOT 1
CSM NO. 6111

OUTLOT 1
CSM NO. 6112

GROUND STORAGE RESERVOIR

INSTALL (2) - 3" CONDUITS FROM 10' UP RESERVOIR TO SCADA PANEL AND INSTALL EXISTING ANTENNA CABLE ON RESERVOIR INTO ONE CONDUIT. CONDUITS SIZED TO ACCOMMODATE CABLE. ENDS EXPOSED TO WEATHER TO BE SEALED WITH RUBBER BOOT

PULL BOX

PUETZ ROAD RESERVOIR CONSTRUCTION LIMITS (TYP.)

8' x 8' TRANSFORMER PAD

UTILITY METER SOCKET

RELOCATED EX. UNDERGROUND ELECTRICAL AND EX. LIGHT POLE

(1) - 1 1/2" C, 2 PRS TO SCADA PANEL
(1) - 1 1/2" C - SPARE

(2) 2"C TO SCADA PANEL

RELOCATED LIGHT POLE WITH 2 SURVEILLANCE CAMERAS

RELOCATED GROUND LIGHT FOR FLAG POLES

LT 1-1-1

PULL BOX

PROPOSED FLAGPOLES

EX SAN MH
RIM 183.57
INV. 170.53
D = 13.04'

EX SAN MH
RIM 192.09
INV. 181.07
D = 11.02'

WEST ORCHARD WAY

SOUTH BREABURN DRIVE

" PVC=INV 188.95"

File: R:\ARCH_WORK_ARCH\2007_proj\ARCH0710.dwg
Plot Date: Sep 01, 2009 - 2:31pm

LAYOUT: LAYOUT
PLAN VIEW: PLAN

SA.	Consultant: Robert E. Lee & Associates, Inc.	CITY OF OAK CREEK, WISCONSIN				APPROVED BY
ST.						UTILITY ENGINEER DATE
W.		DESIGNED BY DATE	DRAWN BY DATE	CHECKED BY DATE		APPROVED BY
G.		D.A.M. 8/13/09	R.L.B. 8/13/09	K.A.K. 8/13/09		CITY ENGINEER DATE
E.	ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES	ELECTRICAL SITE PLAN				SCALE / SHEET
T.		IN: PUETZ ROAD BOOSTER STATION				PLAN HOR. 1"=20' / 14
I.						PROFILE HOR. N.T.S. / OF
TS.						VER. N.T.S. / 53
PP.	4664 GOLDEN POND PARK CT. HOBART, WISCONSIN 54155 PHONE: 920-662-9641 FAX: 920-662-9141 WWW.RELEEINC.COM					
	REVISION BY DATE	FILE NO: 08101				05-E-01

RTU-A
SCADA SYSTEM CONTROL PANEL

TJB-A
TERMINAL JUNCTION BOX

PRESSURE (3)
AFD ETHERNET INTERFACE (2)
PRESSURE (2)
OC
OC
PF
FLOW TOTAL (2)
FLOW RATE (2)
PRESSURE (4)
AFD ETHERNET INTERFACE (4)
PRESSURE (4)
FLOW TOTAL (2)
PF
FLOW RATE (2)
OC
OC
OC
OC
OC
OC HIGH/LOW
CHLORINE RESIDUAL
LOW
REQ'D (2)
MOTION (3)
MOTOR TEMP (2)
SPEED (2)
AFD FAULT (2)
REQ'D (2)
AUTO (2)
RUN (2)
OC
OC
REQ'D RUN FAIL
ENTRY (3)
MOTOR TEMP (4)
SPEED (4)
AFD FAULT (4)
REQ'D (4)
AUTO (4)
RUN (4)
PRESSURE
(2)
REQ'D RUN FAIL
ROOM HI/L TEMP (4)
POWER ALARMS (4)
CHLORINE ROOM HVAC SYSTEM INTERLOCK
PUMP ROOM HVAC SYSTEM INTERLOCK
XS 9-1-1 PUMP ROOM
XS 9-1-2 GEN. ROOM
XS 9-1-3 MCC ROOM
HS 2-2-1-2 RESET (2)
TAH 2-2-1-1 (2)
MOTOR TEMP
AFD MCC-A
HIK 2-2-1 (2)
YA 2-2-1-1 (2) AFD FAULT
HS 2-2-1-1 (2) HOA
YL 2-2-1-1 (2) REQ'D
KQI 2-2-1 (2) RUN TIME
YL 2-2-1-2 (2) RUN
ZS 9-2-1 PUMP ROOM
ZS 9-2-2 GEN. ROOM
ZS 9-2-3 MCC ROOM
LSH 9-1-1 FLOOD
HS 4-2-1-2 (4) RESET
TAH 4-2-1-1 (4) MOTOR TEMP
AFD MCC-A
HIK 4-2-1 (4)
YA 4-2-1-1 (4) AFD FAULT
HS 4-2-1-1 (4) HOA
YL 4-2-1-1 (4) REQ'D
KQI 4-2-1 (4) RUN TIME
YL 4-2-1-2 (4) RUN
TSH/L 6-1-1 PUMP ROOM
TSH/L 6-1-2 CHEMICAL ROOM
TSH/L 6-1-3 GEN. ROOM
TSH/L 6-1-4 MCC ROOM
JS 8-1-1 GEN. RUN
JS 8-1-2 GEN. FAIL
JS 8-1-3 GEN. EXERCISE
JS 8-1-4 ATS NORMAL
XS 7-1-1 CHEM. HVAC SS/RUN
XS 7-1-2 CHEM. HVAC SS/RUN
MOTOR TEMP (2)
MOTOR POWER (2)
PIT 2-1-1
TSH 2-2-1 MOTOR TEMP
PIT 2-3-1
FIT 2-4-1
LOWER ZONE BOOSTER PUMP NO.1 P-2-2-1 **
PIT 2-1-2
TSH 2-2-2 MOTOR TEMP
PIT 2-3-2
FE 2-4-1
LOWER ZONE BOOSTER PUMP NO.2 P-2-2-2 **
12"
FV 2-5-1
FIT 1-3-1
PIT 1-1-1
LT 1-1-1 RESERVOIR LEVEL
TO AND FROM GROUND STORAGE RESERVOIR
FE 1-3-1
16"
FV 1-2-1
WIT 3-4-1
WE 3-4-1
UPPER ZONE CHLORINE FEED PUMP P-3-4-1 ***
AIT 3-1-1 CHLORINE RESIDUAL
AE 3-1-1 CHLORINE RESIDUAL
PIT 3-3-1
FV 3-2-1
MOTOR TEMP (4)
MOTOR POWER (4)
PIT 4-1-1
TSH 4-2-1 MOTOR TEMP
PIT 4-3-1
UPPER ZONE BOOSTER PUMP NO.3 P-4-2-1 **
PIT 4-1-2
TSH 4-2-2 MOTOR TEMP
PIT 4-3-2
UPPER ZONE BOOSTER PUMP NO.4 P-4-2-2 **
PIT 4-1-3
TSH 4-2-3 MOTOR TEMP
PIT 4-3-3
UPPER ZONE BOOSTER PUMP NO.5 P-4-2-3 **
PIT 4-1-4
TSH 4-2-4 MOTOR TEMP
PIT 4-3-4
UPPER ZONE BOOSTER PUMP NO.6 P-4-2-4 **
WIT 5-3-1
WE 5-3-1
UPPER ZONE CHLORINE FEED PUMP P-5-3-1 ***
FIT 5-1-1
FE 5-1-1
12"
PIT 5-2-1
AIT 5-2-1
AE 5-2-1 CL2 RESID
FV 5-2-1
TO AND FROM UPPER ZONE

File: R:\4900\4931\49310001\dwg\ONE LINE DIAGRAM.dwg
Plot Date: May 11, 2009 - 2:29pm
LAYOUT: LAYOUT
PLAN VIEW: PLAN

SA.	
ST.	
W.	
G.	
E.	
T.	
I.	
TS.	
PP.	

Consultant:
Robert E. Lee & Associates, Inc.
ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES
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HOBART, WISCONSIN 54155
PHONE: 920-662-9641
FAX: 920-662-9141
WWW.RELEEINC.COM

REVISION BY | DATE

CITY OF OAK CREEK, WISCONSIN

DESIGNED BY	DATE	DRAWN BY	DATE	CHECKED BY	DATE
D.A.M.	8/13/09	R.L.B.	8/13/09	K.A.K.	8/13/09

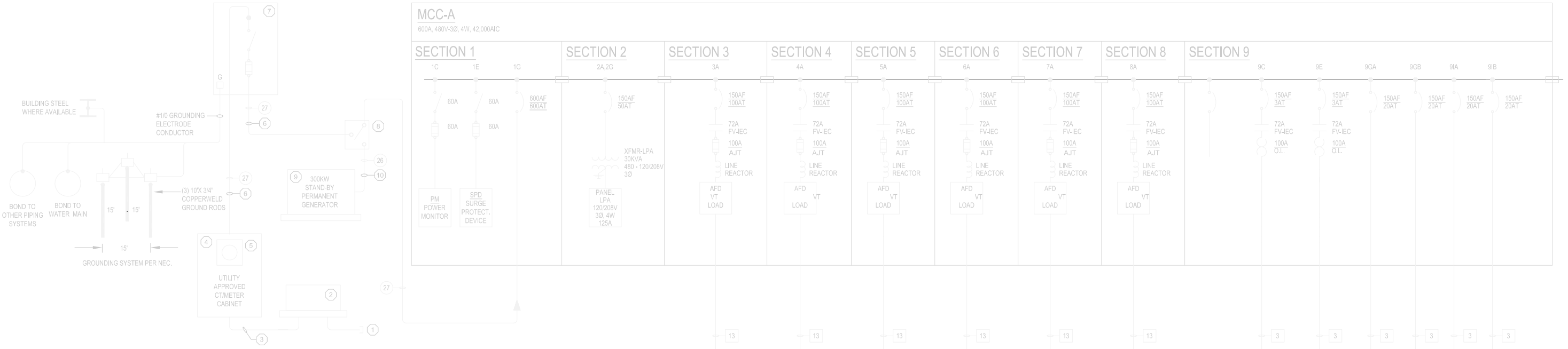
ONE LINE DIAGRAM
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	15
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

07-E-01



GENERAL NOTES:

1. COORDINATE ELECTRIC SERVICE REQUIREMENTS WITH ELECTRIC UTILITY. ALL ELECTRIC UTILITY COSTS SHALL BE PAID UNDER UTILITY ALLOWANCE LISTED ON THE BID FORM AND IDENTIFIED IN THE SPECIFICATIONS.

PLAN NOTES:

1. UTILITY PRIMARY CONDUITS: PROVIDE 2-5" CONDUITS FOR UTILITY INSTALLATION OF PRIMARY CONDUCTORS. STUB OUT FROM TRANSFORMER PAD PER UTILITY REQUIREMENTS.
2. UTILITY PAD-MOUNTED TRANSFORMER: PROVIDE CONCRETE PAD PER UTILITY REQUIREMENTS FOR UTILITY INSTALLATION OF PAD-MOUNTED TRANSFORMER. UTILITY TRANSFORMER SHALL PROVIDE 600A-277/48V 3ϕ,4W ELECTRIC SERVICE TO THE FACILITY.
3. UTILITY TRANSFORMER SECONDARY CIRCUIT: PROVIDE 2-5" CONDUITS FOR UTILITY INSTALLATION OF TRANSFORMER SECONDARY CIRCUIT AS SHOWN. TERMINATIONS AT TRANSFORMER AND CT CABINET BY UTILITY.
4. UTILITY APPROVED CT CABINET: PROVIDE CT CABINET SUITABLE FOR THE ELECTRIC SERVICE SHOWN AND PER UTILITY REQUIREMENTS FOR UTILITY INSTALLATION OF CURRENT TRANSFORMERS.
5. UTILITY APPROVED METER SOCKET: PROVIDE METER SOCKET SUITABLE FOR THE ELECTRIC SERVICE SHOWN AND PER UTILITY REQUIREMENTS FOR UTILITY INSTALLATION OF METER AND (1)1-1/4" CONDUIT TO CT CABINET PER UTILITY REQUIREMENTS FOR UTILITY INSTALLATION OF METERING CONDUCTORS.
6. SERVICE ENTRANCE CIRCUIT: PROVIDE SERVICE ENTRANCE CIRCUIT AS SHOWN.
7. SERVICE DISCONNECT SWITCH: PROVIDE 600A FUSIBLE SERVICE DISCONNECT SWITCH WITH SOLID NEUTRAL.
8. AUTOMATIC TRANSFER SWITCH: PROVIDE 600A 3P, 4W (OVERLAPPING NEUTRAL) AUTOMATIC TRANSFER SWITCH AS SHOWN.
9. STAND-BY PERMANAENT GENERATOR: PROVIDE 300KW, NATURAL GAS-FUELED STAND-BY GENERATOR COMPLETE WITH 500A CIRCUIT BREAKER, FUEL SYSTEM, EXHAUST SYSTEM, AND OTHER ACCESSORIES AS SHOWN, SPECIFIED, AND DETAILED.
10. GENERATOR CIRCUIT: PROVIDE GENERATOR CIRCUIT AS SHOWN.

MCC-A
MOTOR CONTROL CENTER FRONT ELEVATION
NTS

FEEDER SCHEDULE

IDENTIFIER	THERMAL-MAGNETIC CIRCUIT BREAKER	BREAKER PICKUP AMPS (80%)	SINGLE-PHASE TWO-WIRE CIRCUIT		SINGLE OR THREE-PHASE THREE-WIRE CIRCUIT		THREE-PHASE FOUR-WIRE CIRCUIT		ALL	MAX. DISTANCES (FT) 480V 3-PHASE		MAX. DISTANCES (FT) 240V 3-PHASE		MAX. DISTANCES (FT) 208V 3-PHASE OR 120/240V 1-PHASE	
			CONDUIT	CIRCUIT CONDUCTORS	CONDUIT	CIRCUIT CONDUCTORS	CONDUIT	CIRCUIT CONDUCTORS	EQUIPMENT GROUNDING CONDUCTOR	FEEDER (2% DROP)	BRANCH (3% DROP)	FEEDER (2% DROP)	BRANCH (3% DROP)	FEEDER (2% DROP)	BRANCH (3% DROP)
1	10	8	3/4"	(2) #12	3/4"	(3) #12	3/4"	(4) #12	#12	335	502	167	251	145	218
2	15	12	3/4"	(2) #12	3/4"	(3) #12	3/4"	(4) #12	#12	223	335	112	167	97	145
3	20	16	3/4"	(2) #12	3/4"	(3) #12	3/4"	(4) #12	#12	167	251	84	126	73	109
4	25	20	3/4"	(2) #10	3/4"	(3) #10	3/4"	(4) #10	#10	212	317	106	159	92	138
5	30	24	3/4"	(2) #10	3/4"	(3) #10	3/4"	(4) #10	#10	176	264	88	132	76	115
6	35	28	3/4"	(2) #8	3/4"	(3) #8	3/4"	(4) #8	#10	241	361	120	181	104	157
7	40	32	3/4"	(2) #8	3/4"	(3) #8	3/4"	(4) #8	#10	211	316	105	158	91	137
8	45	36	3/4"	(2) #8	3/4"	(3) #8	3/4"	(4) #8	#10	187	281	94	140	81	122
9	50	40	3/4"	(2) #8	3/4"	(3) #8	3/4"	(4) #8	#10	169	253	84	126	73	110
10	60	48	3/4"	(2) #6	3/4"	(3) #6	1"	(4) #6	#10	294	396	112	168	97	146
11	70	56	1"	(2) #4	1"	(3) #4	1-1/4"	(4) #4	#8	305	457	152	228	132	198
12	80	64	1"	(2) #4	1"	(3) #4	1-1/4"	(4) #4	#8	266	400	133	200	115	173
13	90	72	1"	(2) #3	1"	(3) #3	1-1/4"	(4) #3	#8	290	436	145	218	126	189
14	100	80	1"	(2) #3	1"	(3) #3	1-1/4"	(4) #3	#8	251	392	131	196	113	170
15	110	88	1"	(2) #2	1"	(3) #2	1-1/2"	(4) #2	#6	307	461	154	230	133	200
16	125	100	1-1/4"	(2) #1	1-1/2"	(3) #1	1-1/2"	(4) #1	#6	340	510	170	255	147	221
17	150	120	1-1/4"	(1) #1/0	1-1/2"	(3) #1/0	2"	(4) #1/0	#6	355	533	178	266	154	231
18	175	140	N/A	N/A	2"	(3) #2/0	2"	(4) #2/0	#6	377	566	189	283	163	245
19	200	160	N/A	N/A	2"	(3) #3/0	2"	(4) #3/0	#6	413	619	206	310	179	268
20	225	180	N/A	N/A	2"	(3) #4/0	2-1/2"	(4) #4/0	#4	459	688	229	344	199	298
21	250	200	N/A	N/A	2-1/2"	(3) 250KCMIL	3"	(4) 250KCMIL	#4	484	725	242	363	210	314
22	300	240	N/A	N/A	3"	(3) 350KCMIL	3"	(4) 350KCMIL	#4	552	829	276	414	239	359
23	350	280	N/A	N/A	3"	(3) 500KCMIL	3-1/2"	(4) 500KCMIL	#3	647	970	323	485	280	420
24	400	320	N/A	N/A	3-1/2"	(3) 600KCMIL	4"	(4) 600KCMIL	#3	661	992	331	496	286	430
25	450	360	N/A	N/A	(2) 2"	2 SETS OF (3) #4/0	(2) 2-1/2"	2 SETS OF (4) #4/0	#2	459	688	229	344	199	298
26	500	400	N/A	N/A	(2) 2-1/2"	2 SETS OF (3) 250KCMIL	(2) 3"	2 SETS OF (4) 250KCMIL	#2	484	725	242	363	210	314
27	600	480	N/A	N/A	(2) 3"	2 SETS OF (3) 350KCMIL	(2) 3"	2 SETS OF (4) 350KCMIL	#1	552	829	276	414	239	359
28	700	560	N/A	N/A	(2) 3"	2 SETS OF (3) 500KCMIL	(2) 3-1/2"	2 SETS OF (4) 500KCMIL	#1/0	647	970	323	485	280	420
29	800	640	N/A	N/A	(2) 3-1/2"	2 SETS OF (3) 600KCMIL	(2) 4"	2 SETS OF (4) 600KCMIL	#1/0	661	992	331	496	286	430
30	900	720	N/A	N/A	(3) 3"	3 SETS OF (3) 350KCMIL	(3) 3"	3 SETS OF (4) 350KCMIL	#2/0	552	829	276	414	239	359
31	1000	800	N/A	N/A	(4) 2-1/2"	4 SETS OF (3) 250KCMIL	(4) 3"	4 SETS OF (4) 250KCMIL	#2/0	484	725	242	363	210	314
32	1200	960	N/A	N/A	(4) 3"	4 SETS OF (3) 350KCMIL	(4) 3"	4 SETS OF (4) 350KCMIL	#3/0	552	829	276	414	239	359
33	1600	1280	N/A	N/A	(4) 3-1/2"	4 SETS OF (3) 600KCMIL	(4) 4"	4 SETS OF (4) 600KCMIL	#4/0	661	992	331	496	286	430
34	1800	1440	N/A	N/A	(6) 3"	6 SETS OF (3) 350KCMIL	(6) 3"	6 SETS OF (4) 350KCMIL	250KCMIL	552	829	276	414	239	359
35	2000	1600	N/A	N/A	(6) 3"	6 SETS OF (3) 500KCMIL	(6) 3-1/2"	6 SETS OF (4) 500KCMIL	250KCMIL	679	1019	340	509	294	442
36	2500	2000	N/A	N/A	(6) 3-1/2"	6 SETS OF (3) 600KCMIL	(6) 4"	6 SETS OF (4) 600KCMIL	350KCMIL	635	952	317	476	275	413
37	3000	2400	N/A	N/A	(8) 3"	8 SETS OF (3) 500KCMIL	(8) 3-1/2"	8 SETS OF (4) 500KCMIL	400KCMIL	604	905	302	453	262	392
38	4000	3200	N/A	N/A	(10) 3-1/2"	8 SETS OF (3) 600KCMIL	(10) 4"	8 SETS OF (4) 600KCMIL	500KCMIL	529	793	264	397	229	344

PLAN NOTATION:
- ◇ SINGLE-PHASE, TWO-WIRE FEEDER, NUMBER IS THE FEEDER IDENTIFIER
- □ SINGLE OR THREE-PHASE, THREE-WIRE FEEDER, NUMBER IS THE FEEDER IDENTIFIER
- ○ THREE-PHASE, FOUR-WIRE FEEDER, NUMBER IS THE FEEDER IDENTIFIER

SA.
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D.A.M.	8/13/09	R.L.B.	8/13/09	K.A.K.	8/13/09

PROCESS INSTRUMENTATION DIAGRAM
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	16
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

09-E-01

PLAN VIEW: PLAN
LAYOUT: LAYOUT
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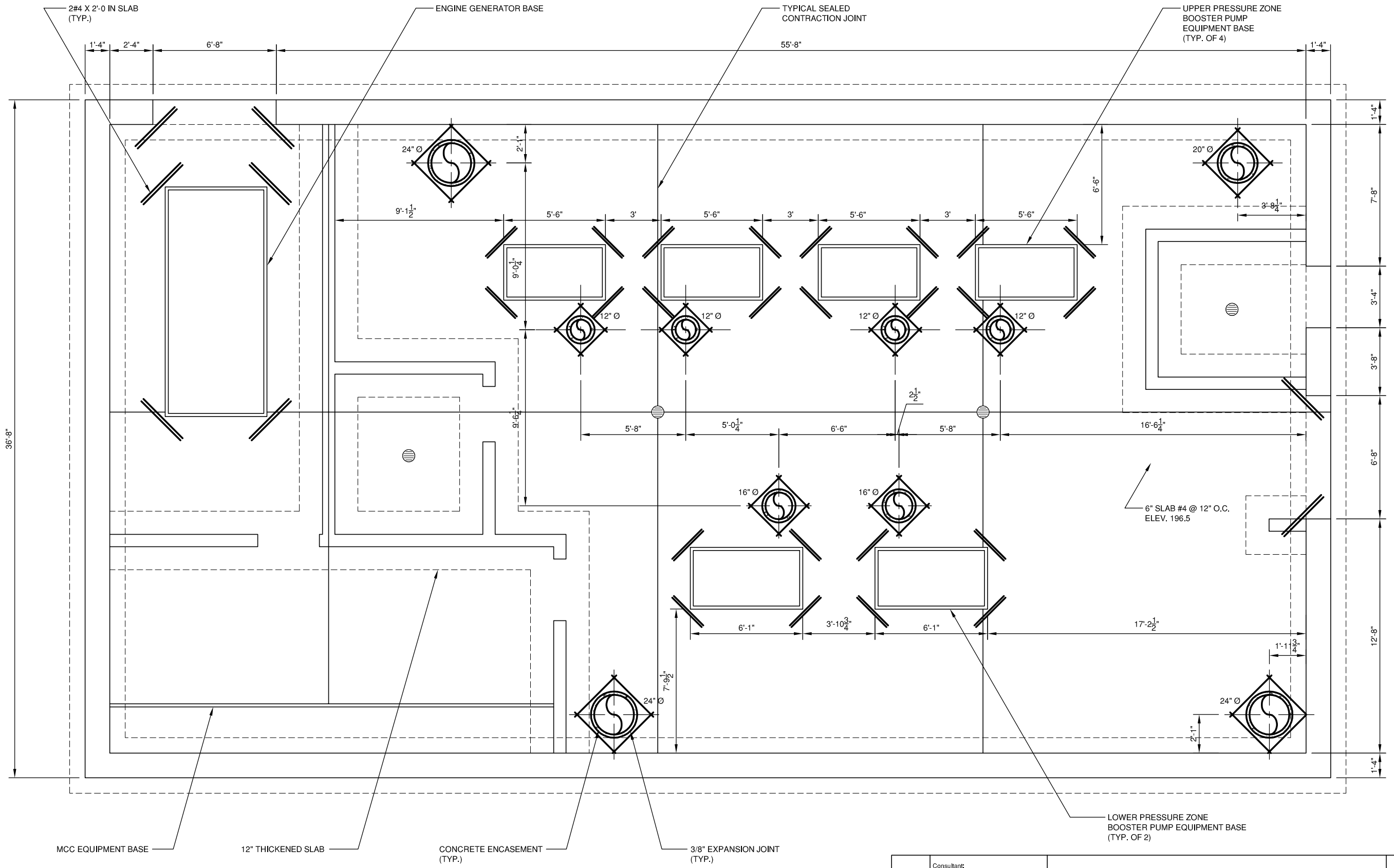
Plot Date: 5 Oct 2009 - 2:56pm



NORTH

FOUNDATION PLAN

SCALE: 3/8" = 1'-0"

File: R:\ARCH\08101\08101(1.dwg) PR FOUNDATION PLAN.dwg
Plot Date: Sep 01, 2009 - 2:50pm
LAYOUT:
PLAN VIEW: PLAN

SA.	
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FOUNDATION PLAN
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE

APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	17
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

100-AS-01

ENGINE GENERATOR EQUIPMENT BASE

24" X 24" LOUVER

UPPER PRESSURE ZONE BOOSTER PUMP EQUIPMENT BASE (TYP. OF 4)

24" X 24" LOUVER

67'-4"

1'-4" 2'-4" 6'-8" 2'-6" 8" 52'-6" 1'-4"

48" X 48" LOUVER

12" X 24" LOUVER

12" X 24" LOUVER

22'-2"

11'-2"

1'-4" 12'-10" 5'-8" 8" 1'-4" 3'-4" 2'-8" 8" 4" 6'-8" 8" 4'-0" 8" 4'-8" 2'-8" 1'-4" 36'-8"

3
100-AS-05

ENGINE GENERATOR ROOM
103

RESTROOM
105

MCC ROOM
104

PUMP ROOM
101

CHEMICAL ROOM
102

BORROWED LIGHT
SEE DETAIL E, SHEET 200-AS-02

7'-4"

8'-0"

OFFICE DESK
SEE DETAIL, SHEET 200-AS-06

GLASS BLOCK WINDOW
SEE DETAIL D, SHEET 200-AS-02

103 104 105 106 101 102

8" 8" 3'-0" 5'-0" 1'-4" 3'-4" 7'-2"

8'-0" 3'-4" 8'-0" 3'-2"

2" 8"

4' X 8' TELECOM BACKBOARD

1
100-AS-05

2
100-AS-06

1'-4" 24'-0" 8" 40'-0" 1'-4"

MOTOR CONTROL CENTER EQUIPMENT SUPPORT

LOWER PRESSURE ZONE BOOSTER PUMP EQUIPMENT BASE (TYP. OF 2)

CONTROL JOINT, SEE DETAIL, SHEET 200-AS-04

NORTH

FLOOR PLAN

SCALE: 3/8" = 1'-0"

SA. ST. W. G. E. T. I. TS. PP.

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ARCHITECTURAL/STRUCTURAL FLOOR PLAN

IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE

APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	18
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

100-AS-02

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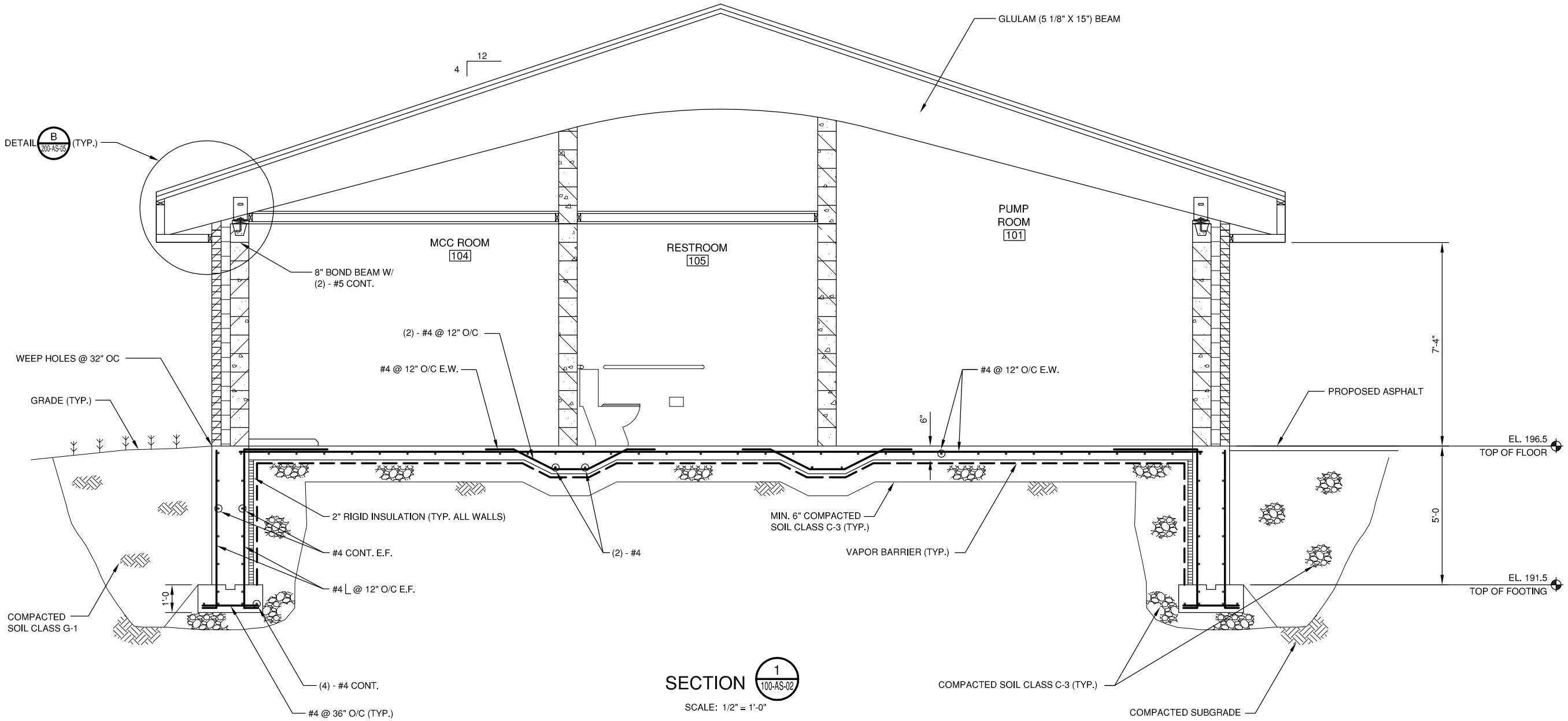

SECTION 1 / 100-AS-02

SCALE: 1/2" = 1'-0"

File: R:_WORK_KRE\1_KRE1001\1_engr\PW_ARCHITECTURAL SECTIONS.dwg
Plot Date: Sep 01, 2009 - 2:32pm
LAYOUT: LAYOUT
PLAN VIEW: PLAN

SA.	Consultant: Robert E. Lee & Associates, Inc.	CITY OF OAK CREEK, WISCONSIN	APPROVED BY UTILITY ENGINEER DATE
ST.	ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES	DESIGNED BY DATE: D.A.M. 8/13/09 | DRAWN BY DATE: R.L.B. 8/13/09 | CHECKED BY DATE: K.A.K. 8/13/09	APPROVED BY CITY ENGINEER DATE
W.	4664 GOLDEN POND PARK CT. HOBART, WISCONSIN 54155 PHONE: 920-662-9641 FAX: 920-662-9141 WWW.RELEEINC.COM	ARCHITECTURAL/STRUCTURAL SECTION IN: PUETZ ROAD BOOSTER STATION	SCALE: PLAN HOR. N.T.S. VER. N.T.S. PROFILE HOR. N.T.S. VER. N.T.S.
G.			SHEET: 19 OF 53
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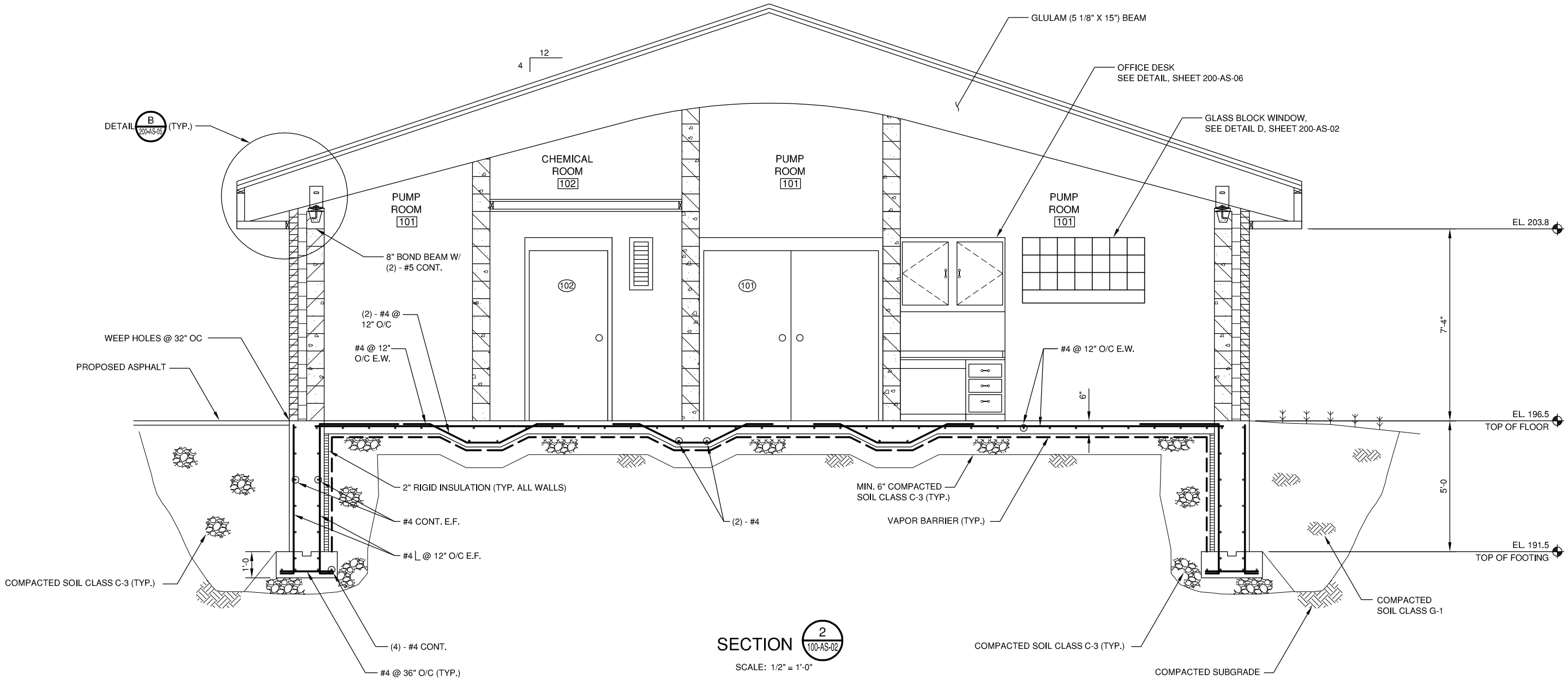
I.			
TS.			
PP.	REVISION BY DATE	FILE NO: 08101	100-AS-03

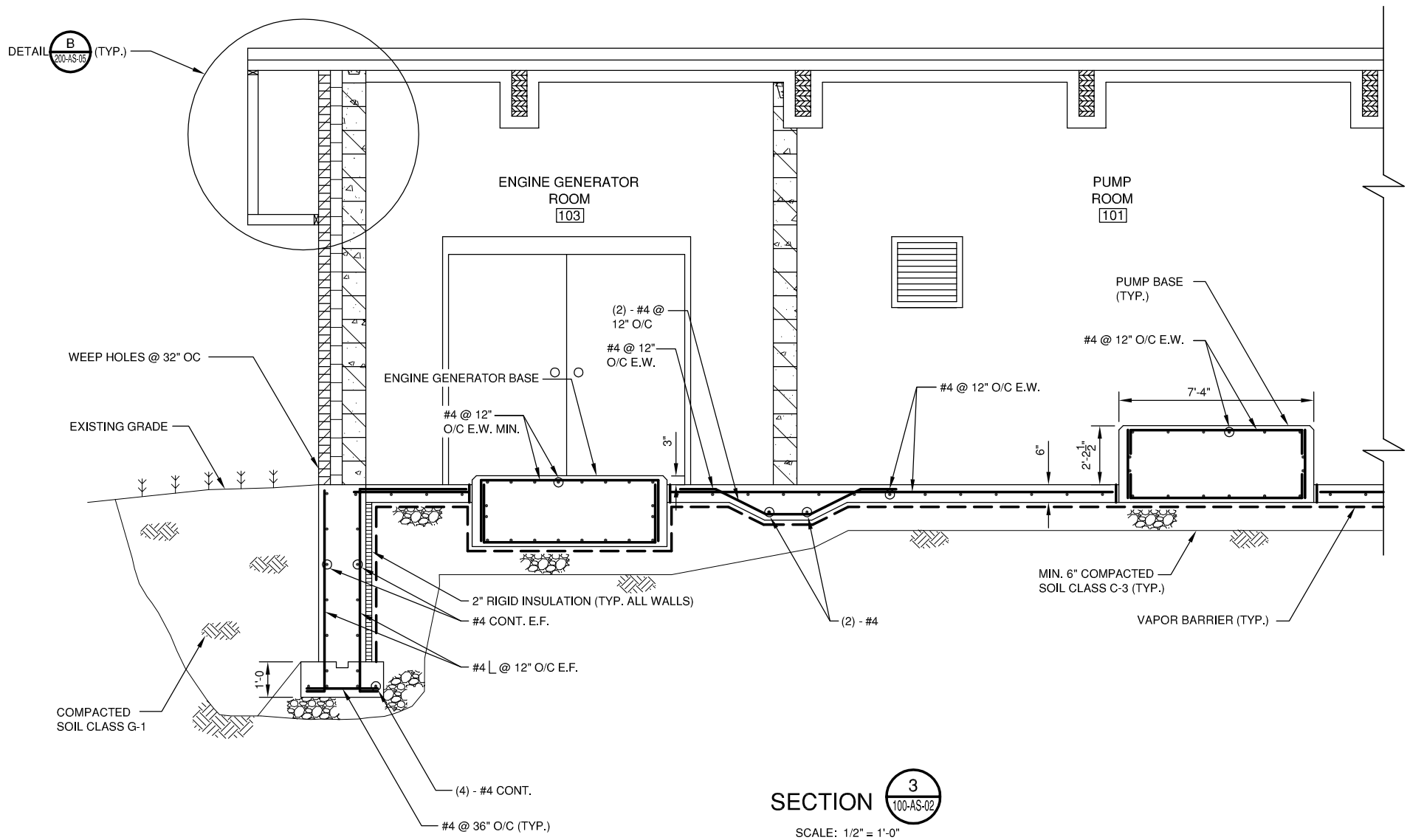


SECTION 2 / 100-AS-02

SCALE: 1/2" = 1'-0"

File: R:\MKE\LAKE\LA\53101\Layout\PW_ARCHITECTURAL SECTIONS.dwg
Plot Date: Sep 01, 2009 - 2:53pm
LAYOUT: LAYOUT
PLAN VIEW: PLAN

SA.	Consultant: Robert E. Lee & Associates, Inc.	CITY OF OAK CREEK, WISCONSIN		APPROVED BY UTILITY ENGINEER DATE
ST.		DESIGNED BY DATE	DRAWN BY DATE	CHECKED BY DATE
W.		D.A.M. 8/13/09	R.L.B. 8/13/09	K.A.K. 8/13/09
G.				APPROVED BY CITY ENGINEER DATE
E.	ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES	ARCHITECTURAL/STRUCTURAL SECTION		SCALE / SHEET
T.		IN: PUETZ ROAD BOOSTER STATION		PLAN HOR. N.T.S. / 20
I.	4664 GOLDEN POND PARK CT. HOBART, WISCONSIN 54155 PHONE: 920-662-9641 FAX: 920-662-9141 WWW.RELEEINC.COM			PROFILE HOR. N.T.S. VER. N.T.S. / OF 53
TS.				
PP.				
	REVISION BY DATE	FILE NO: 08101		100-AS-04



SECTION 3 / 100-AS-02

SCALE: 1/2" = 1'-0"

NOTE:

1. PUMP SUPPORT HEIGHT TO SUIT EQUIPMENT PROVIDED.

File: P:\ARCH\08101\08101(Dwg)\08_ARCHITECTURAL SECTIONS.dwg
Plot Date: Sep 01, 2009 - 12:34pm

LAYOUT:

PLAN VIEW: PLAN

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ARCHITECTURAL/STRUCTURAL SECTION

IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE

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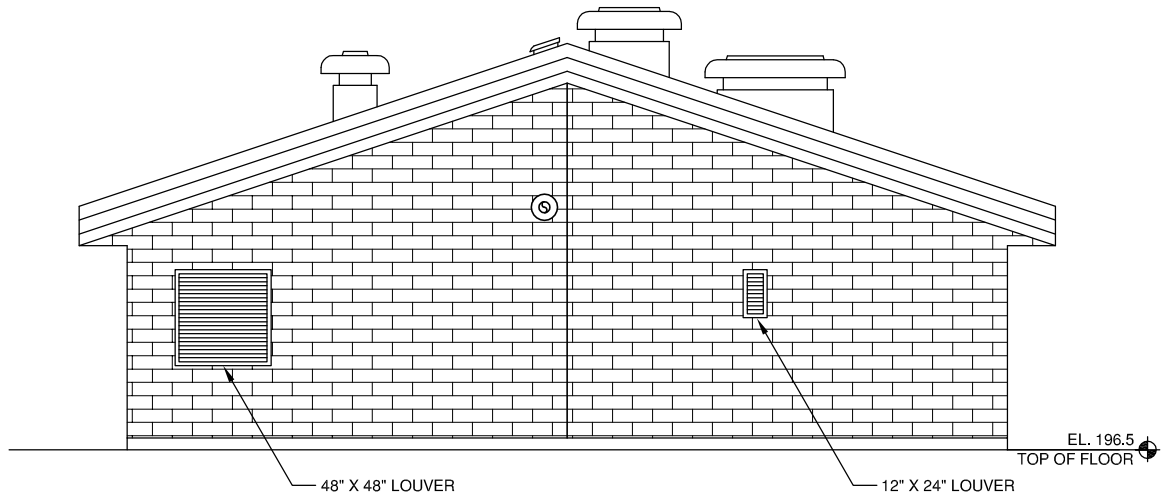
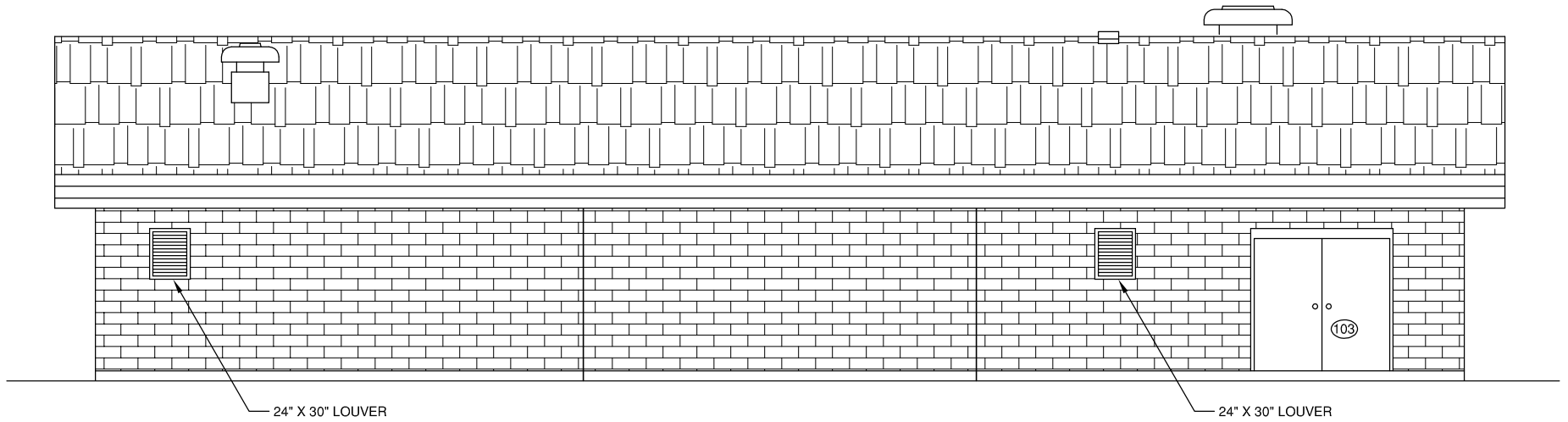
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	21
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

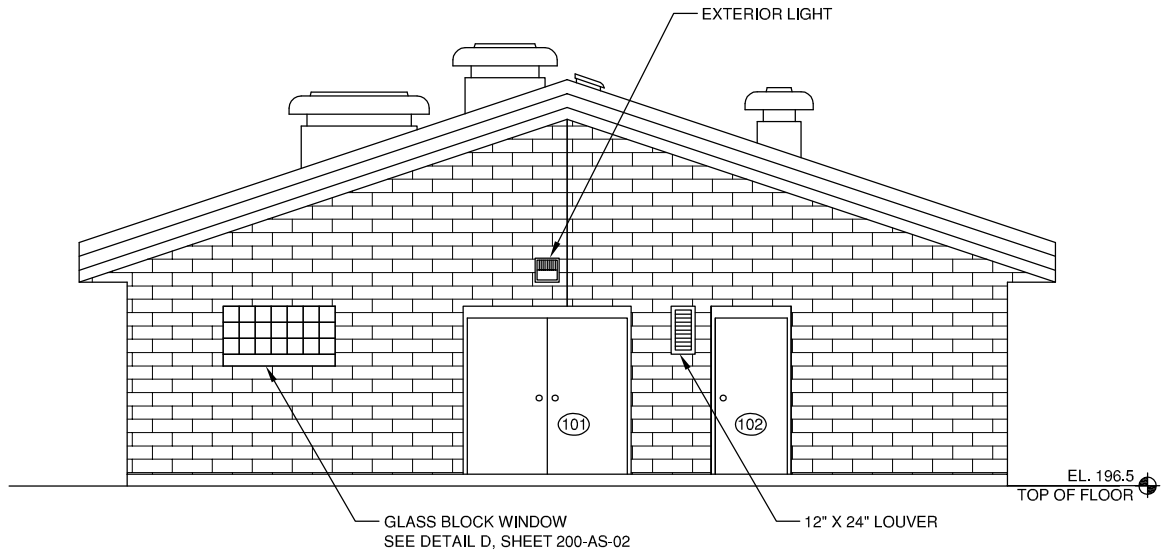
100-AS-05



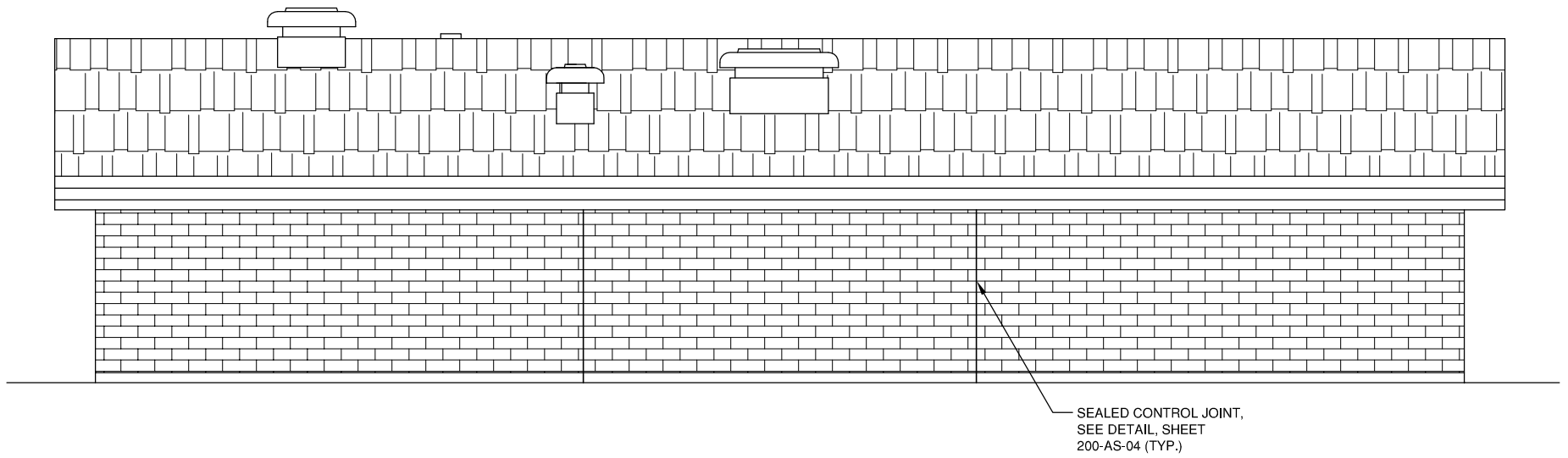
NORTH ELEVATION
SCALE: 3/8" = 1'-0"



EAST ELEVATION
SCALE: 3/8" = 1'-0"



SOUTH ELEVATION
SCALE: 3/8" = 1'-0"



WEST ELEVATION
SCALE: 3/8" = 1'-0"

File: R:\14001-14501\14311001\Layout\Plan_ELEVATIONS.dwg
Plot Date: Sep 01, 2009 - 2:35pm
LAYOUT: LAYOUT
PLAN VIEW: PLAN

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BUILDING ELEVATIONS
IN: PUETZ ROAD BOOSTER STATION

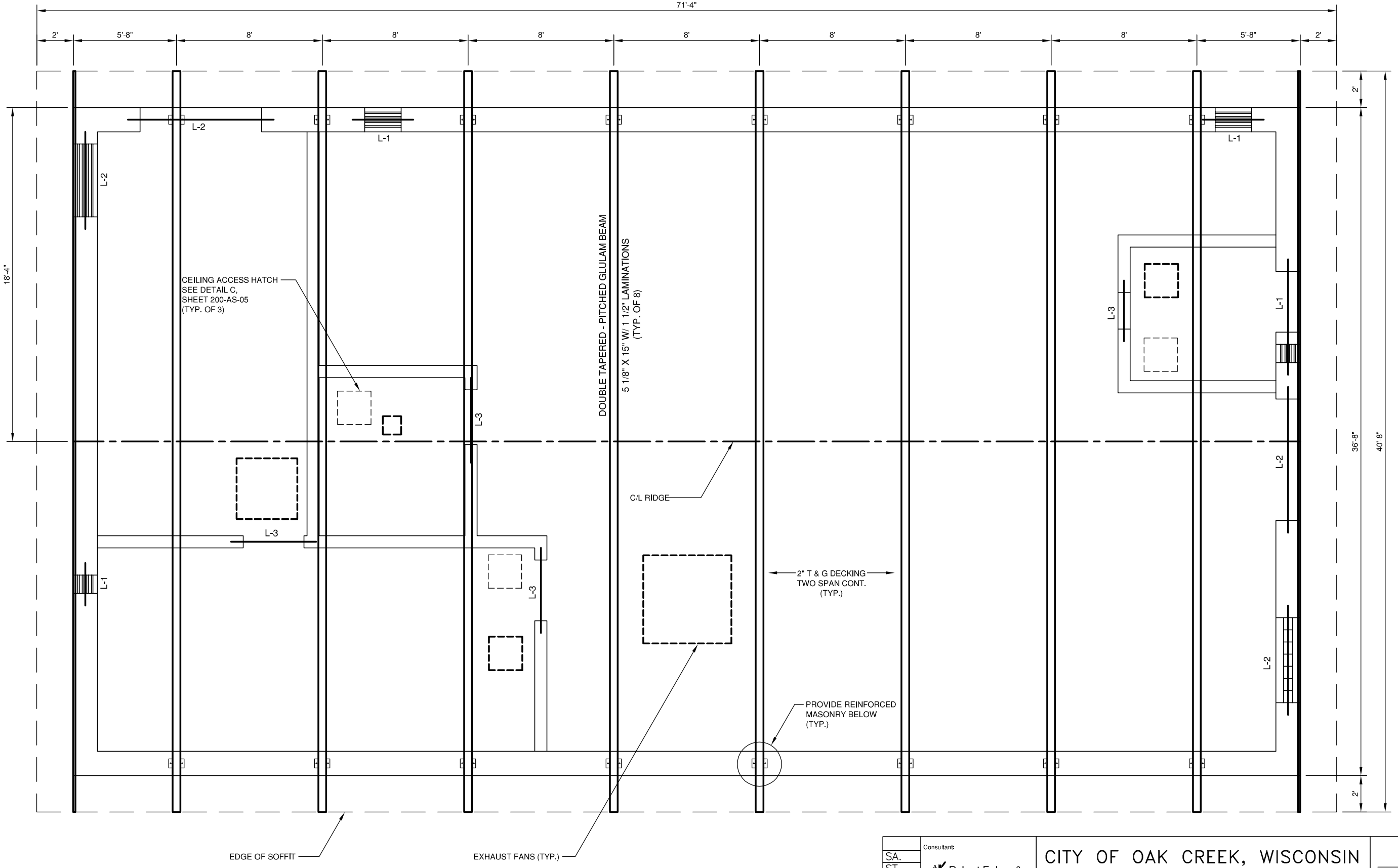
FILE NO: 08101

APPROVED BY
UTILITY ENGINEER ____ DATE

APPROVED BY
CITY ENGINEER ____ DATE

SCALE	SHEET
PLAN HOR. N.T.S.	22
PROFILE HOR. N.T.S. VER. N.T.S.	OF 53

100-AS-06



NORTH

ROOFING PLAN

SCALE: 3/8" = 1'-0"

File: R:_WORK AREA\LAYOUTS\puetz ROOF FRAMING PLAN.dwg
Plot Date: Sep 01, 2009 - 2:34pm
LAYOUT: LAYOUT
PLAN VIEW: PLAN

SA.
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CITY OF OAK CREEK, WISCONSIN

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D.A.M. 8/13/09	R.L.B. 8/13/09	K.A.K. 8/13/09

ROOF FRAMING PLAN
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	23
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

100-AS-07

CONNECT TO GAS METER BY LOCAL UTILITY 4200CFM @ 10"-20" H2O

2" GAS CONNECTED TO ENGINE GENERATOR

EXHAUST SILENCER

CATALYTIC CONVERTER

1 1/2" ED

VACUUM BREAKER

1" PW

CV7241 AIR RELEASE VALVE (4-INCH)

CV7254

24"PW

1 1/4" PW

EG7310

SV7310

ECB7377

PNL7310

ENGINE GENERATOR ROOM 103

RESTROOM 105

MEE7376

MCC ROOM 104

PUMP ROOM 101

P7213

P7214

P7215

P7216

P7211

P7212

10" X 12" REDUCING ELBOW (TYP. OF 4)

12" X 24" TEE (TYP. OF 4)

16" X 24" TEE (TYP. OF 2)

14" X 16" REDUCING ELBOW (TYP. OF 2)

24" X 16" REDUCER (TYP. OF 2)

12"PW

1 1/4"PW

20"PW

20" X 10" TEE (TYP. OF 4)

INSULATED PIPE (TYP.)

FE7293

20" X 12" REDUCER (TYP. OF 2)

CV7231 SURGE CONTROL VALVE (6-INCH)

TO AND FROM UPPER PRESSURE ZONE

CHEMICAL ROOM 102

FUTURE WALL MOUNTED CHEMICAL METERING PUMPS

FIRE EXTINGUISHER (TYP. OF 3)

1/2" CLS

CV7253

CV7251

CV7232 SURGE CONTROL VALVE (6-INCH)

TO AND FROM LOWER PRESSURE ZONE

SCADA PANEL PNL7276

SCADA SUB-PANEL PNL7275

AIR RELEASE ASSEMBLY (4-INCH) MCC7170

AE7295

AE7294

1"PW

AIR RELEASE VALVE (4-INCH) CV7242

24"PW

16"PW

TO AND FROM GROUND STORAGE RESERVOIR

1/2"CLS

FE7291

24"PW

24"PW

NOTES:

1. ALL PIPE AND FITTINGS TO BE INSULATED ABOVE FLOOR.
2. US-1 CHICAGO FAUCET 293-E27CP
   US-2 ZURN MODEL Z-1300
   SAMPLE TAP - ZURM CHROME Z-8040

NORTH

FLOOR PLAN

SCALE: 3/8" = 1'-0"

Consultant:
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MECHANICAL PLAN
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

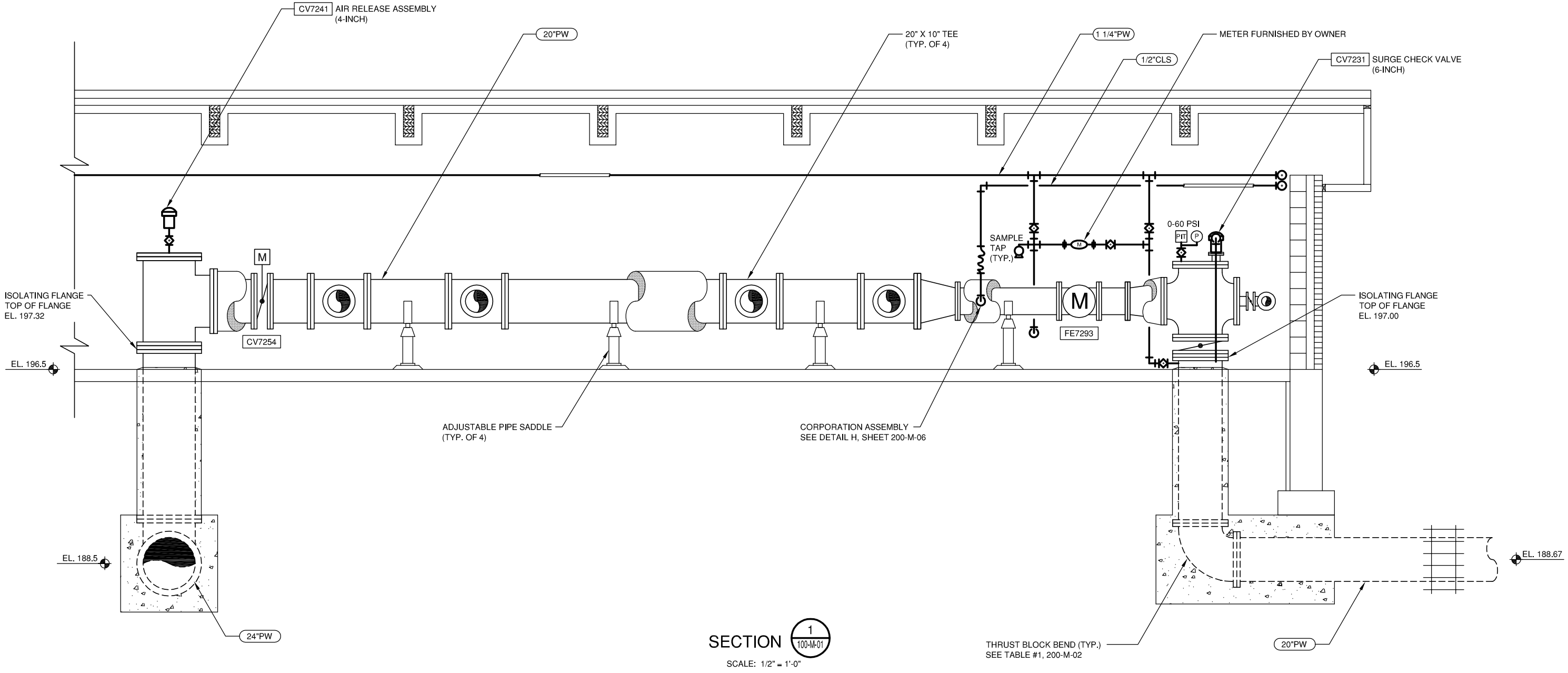
APPROVED BY
UTILITY ENGINEER DATE

APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	24
PROFILE HOR. N.T.S. VER. N.T.S.	OF 53

100-M-01

File: R:\PROJ\08101\102\101\dwg\Pre MECHANICAL PLAN.dwg
Plot Date: Sep 01, 2009 - 2:37pm
LAYOUT: LAYOUT
PLAN VIEW: PLAN



SECTION 1 / 100-M-01

SCALE: 1/2" = 1'-0"

NOTE:

1. ALL PIPE AND FITTINGS TO BE INSULATED ABOVE FLOOR.

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Plot Date: Sep 01, 2009 - 2:39pm
LAYOUT:
LAYOUT: PLAN
PLAN VIEW: PLAN

SA.
ST.
W.
G.
E.
T.
I.
TS.
PP.

Consultant:
Robert E. Lee & Associates, Inc.
ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES
4664 GOLDEN POND PARK CT.
HOBART, WISCONSIN 54155
PHONE: 920-662-9641
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REVISION BY DATE

CITY OF OAK CREEK, WISCONSIN

DESIGNED BY DATE	DRAWN BY DATE	CHECKED BY DATE
D.A.M. 8/13/09	R.L.B. 8/13/09	K.A.K. 8/13/09

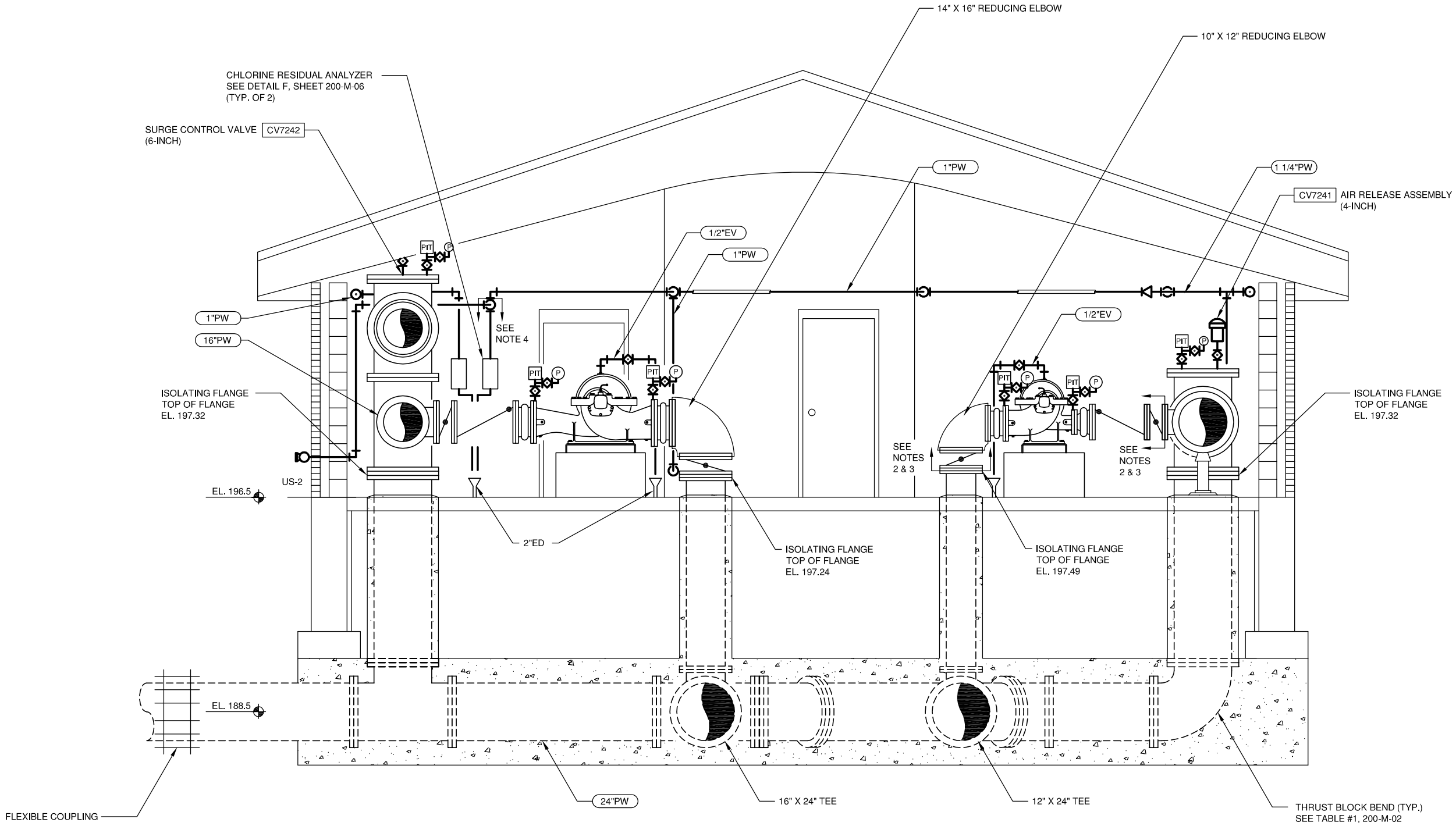
MECHANICAL SECTION
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	25
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

100-M-02



SECTION 2 / 100-M-01

SCALE: 1/2" = 1'-0"

NOTES:

1. ALL PIPE AND FITTINGS TO BE INSULATED ABOVE FLOOR.
2. LIMITS OF ALTERNATE BID UPPER PRESSURE ZONE PUMPS.
3. LOCATION OF BLIND FLANGES.
4. LIMITS OF ALTERNATIVE FOR UPPER PRESSURE ZONE ANALYZER. PROVIDE END CAP.

SA. ST. W. G. E. T. I. TS. PP.

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MECHANICAL SECTION
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE

APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	26
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

100-M-03

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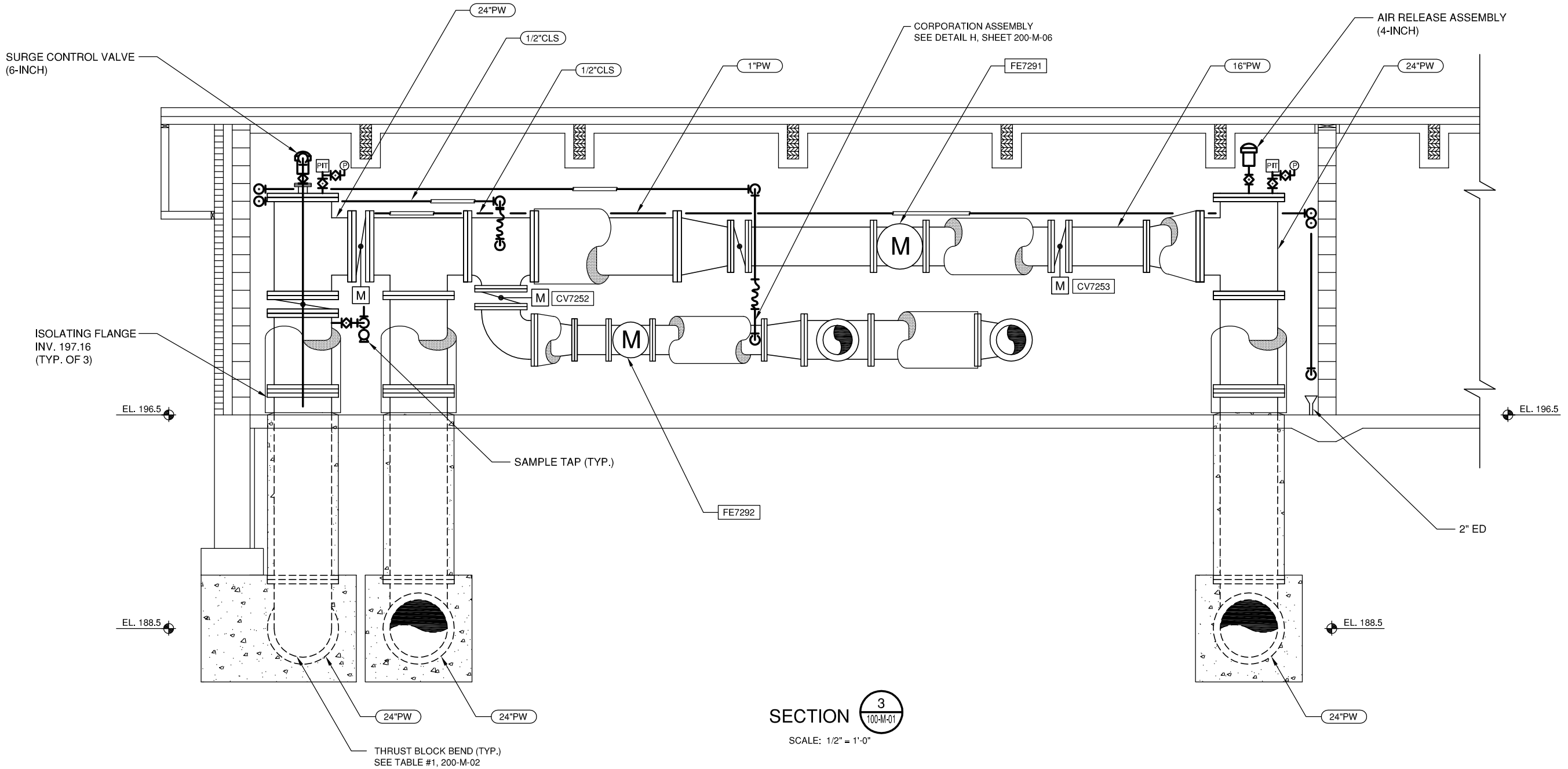
PLAN VIEW: PLAN



SECTION 3 / 100-M-01

SCALE: 1/2" = 1'-0"

NOTE:

1. ALL PIPE AND FITTINGS TO BE INSULATED ABOVE FLOOR.

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MECHANICAL SECTION
IN: PUETZ ROAD BOOSTER STATION

APPROVED BY
UTILITY ENGINEER DATE

APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	27
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

FILE NO: 08101

100-M-04

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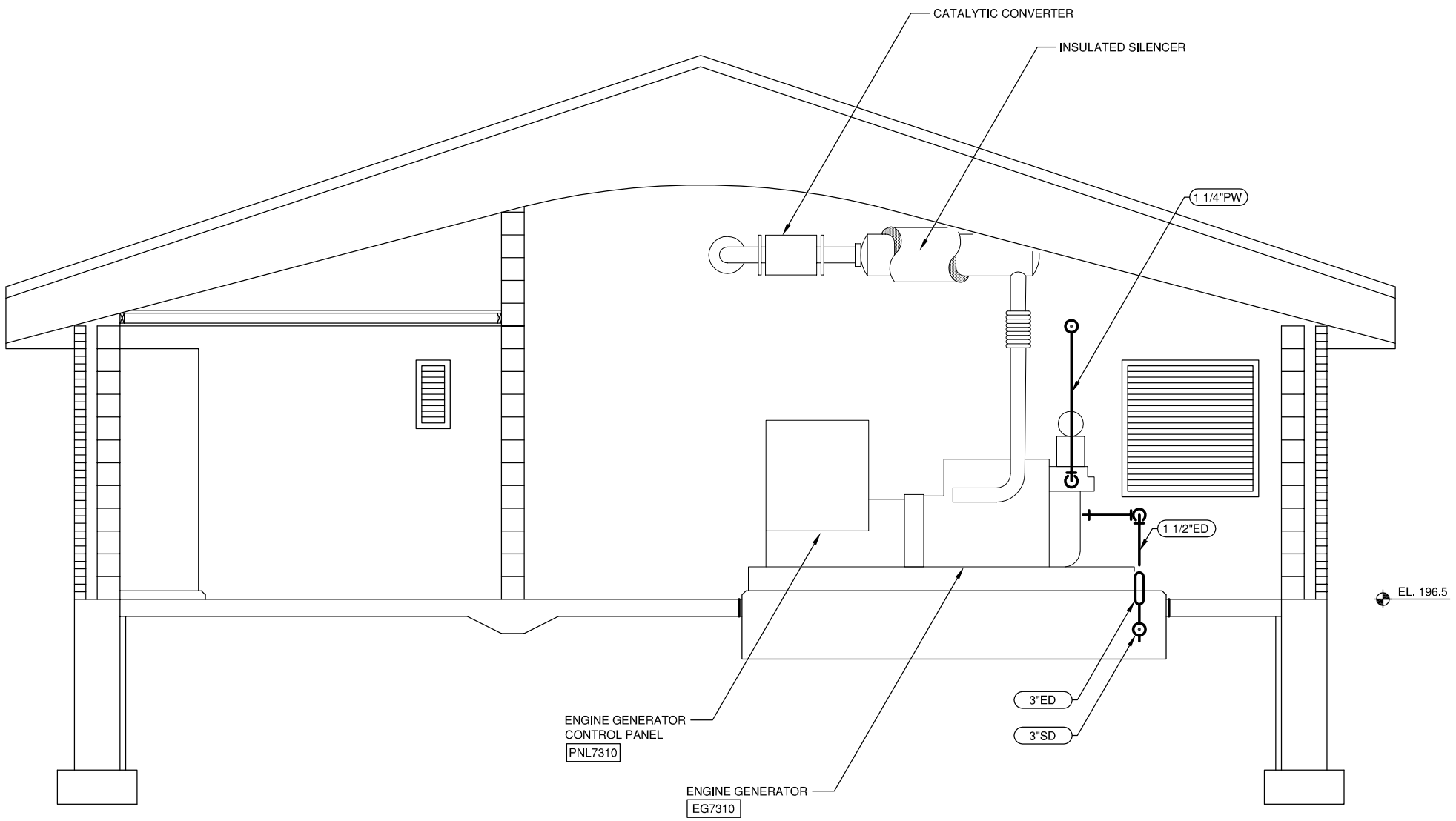
LAYOUT:
LAYOUT
PLAN VIEW:
PLAN



SECTION 4 / 100-M-01

SCALE: 1/2" = 1'-0"

NOTE:

1. ALL PIPE AND FITTINGS TO BE INSULATED ABOVE FLOOR.

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D.A.M.	8/13/09	R.L.B.	8/13/09	K.A.K.	8/13/09

MECHANICAL SECTION
IN: PUETZ ROAD BOOSTER STATION

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	28
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

REVISION BY DATE

FILE NO: 08101

100-M-05

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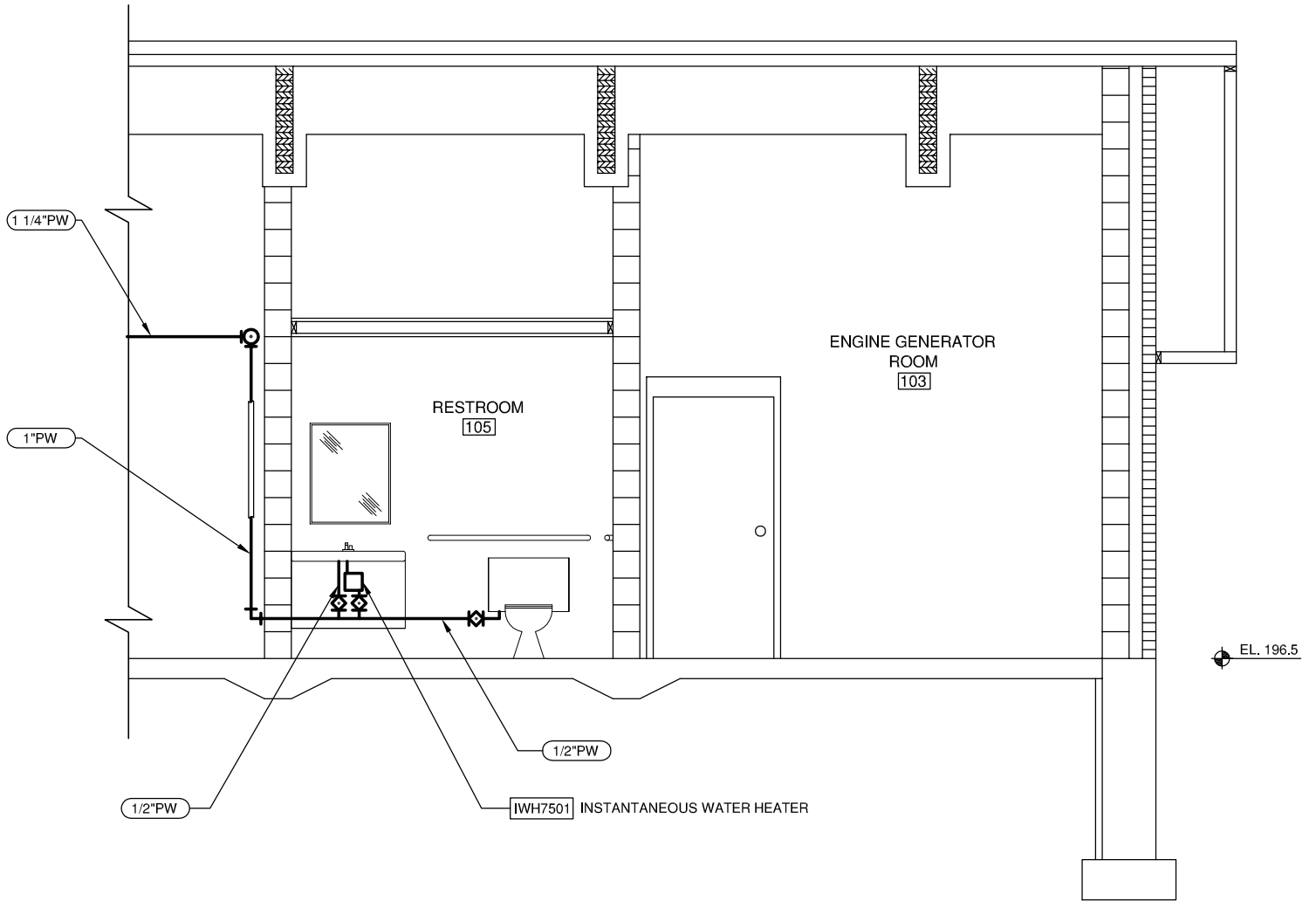

SECTION 5 / 100-M-06

SCALE: 1/2" = 1'-0"

NOTE:

1. ALL PIPE AND FITTINGS TO BE INSULATED ABOVE FLOOR.

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MECHANICAL SECTION
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	29
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

100-M-06

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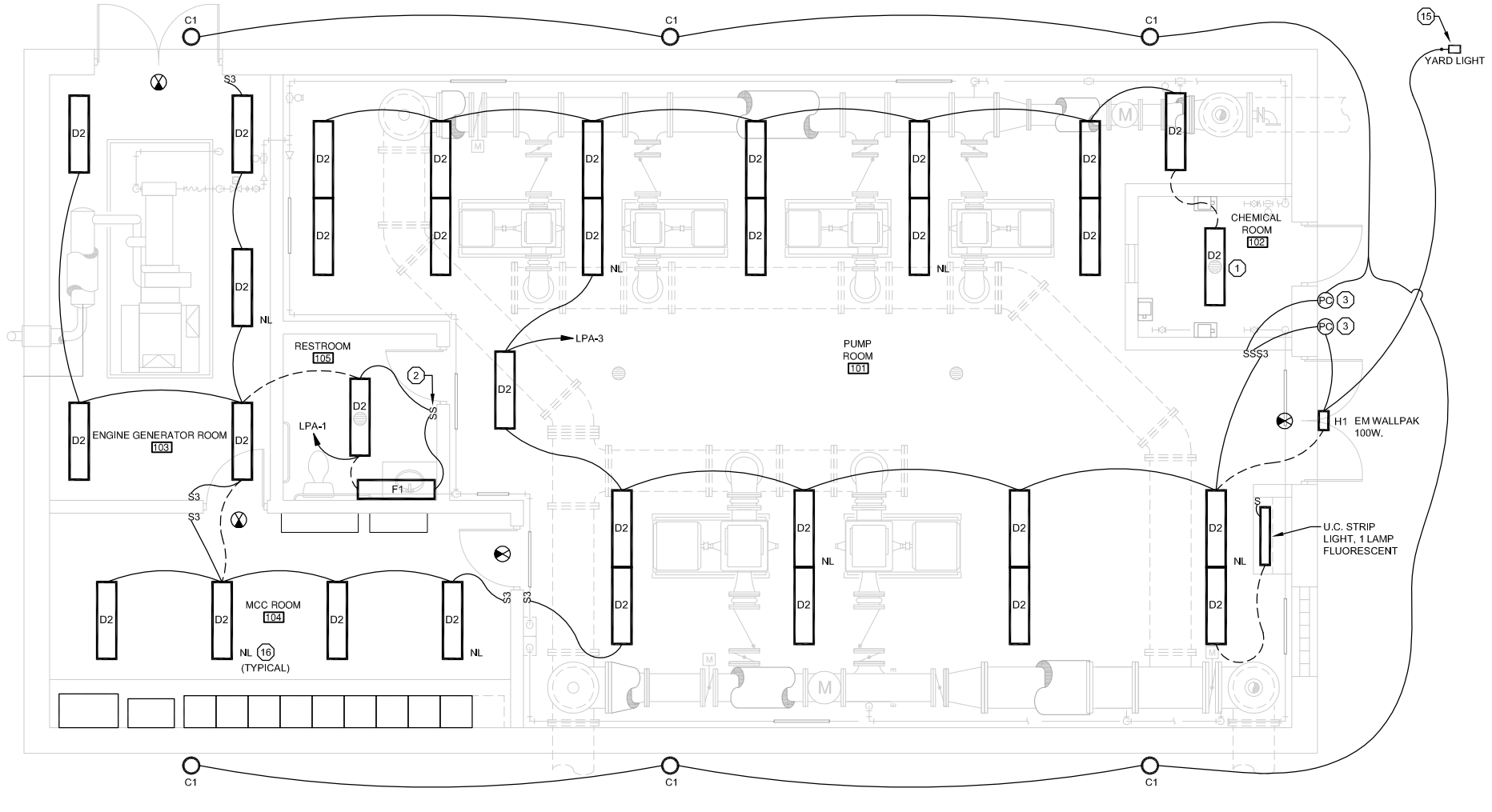

NORTH

LIGHTING PLAN
SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. DO NOT SCALE DRAWINGS. IF DIMENSIONS ARE IN QUESTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING CLARIFICATION FROM ENGINEER PRIOR TO PROCEEDING WITH WORK.
2. HOMERUN WIRING SHALL BE (2)#12 & #12G UNLESS NOTED OTHERWISE.
3. ALL EXTERIOR RECEPTACLES TO BE GFCI WEATHERPROOF, MOUNT AT 30" ABOVE FINISHED GRADE.
4. ALL INTERIOR RECEPTACLES TO BE GFCI MOUNTED AT 42" AFF.
5. MOUNT EXTERIOR "H1" FIXTURE AT 9'-0" ABOVE GRADE.
6. CEILING MOUNT INTERIOR FIXTURES.
7. ROOM/AREA ATMOSPHERE REQUIREMENTS, REFER TO SECTION 16010:
   - 7.1. EXTERIOR: GENERAL, WET, NEW CONSTRUCTION.
   - 7.2. PUMP ROOM: GENERAL, DAMP, NEW CONSTRUCTION.
   - 7.3. TOILET ROOM: GENERAL, DRY, NEW CONSTRUCTION.
   - 7.4. CHLORINE ROOM: CORROSIVE, DAMP, NEW CONSTRUCTION.
   - 7.5. GENERATOR ROOM: GENERAL, DRY, NEW CONSTRUCTION.
8. LIGHT FIXTURES SHALL COMPLY WITH THE FOLLOWING REQUIREMENTS:
   - 8.1. TYPE D2: 4' INDUSTRIAL WET LABEL 2-LAMP FIXTURE WITH 2-F32T8/ADV841/ALTO LAMPS EACH AS MANUFACTURED BY DAYBRITE (MODEL DWAE-232), COLUMBIA (MODEL LUN4-232), OR EQUAL. BALLAST SHALL BE 120V, 0.88 MINIMUM POWER FACTOR, 2-LAMP AS MANUFACTURED BY ADVANCE (MODEL IOP-2P32-SC@1200-FOCUS ON ENERGY INCENTIVE), OR EQUAL.
   - 8.2. TYPE C1: EXTERIOR 6-INCH RECESSED ROUND FLUORESCENT 2-LAMP FIXTURE WITH 1-26WTT LAMP EACH AS MANUFACTURED BY CAPRI (MODEL CFR6V26Q-U-RMA100CLR), OR EQUAL. BALLAST SHALL BE SUITABLE FOR -20 DEGREES F STARTING.
   - 8.3. TYPE F1: 4' WALL UP/DOWN FLUORESCENT 2-LAMP FIXTURE WITH 2-F32T8/SP41/ALTO LAMPS EACH AS MANUFACTURED BY DAYBRITE (MODEL CB232W), COLUMBIA (MODEL WAL4-1U1D), OR EQUAL.
   - 8.4. TYPE H1: EXTERIOR WEDGE DOWNLIGHT FIXTURE WITH 1-100MH LAMP EACH AS MANUFACTURED BY NITEBRITE (MODEL WLM100MMT), OR EQUAL
   - 8.5. EXIT: SINGLE FACE EXIT AS MANUFACTURED BY COOPER SURE-LITES (MODEL LPX-7-O-LPX7-R-WH-SD-WG10), OR EQUAL.

8.6. YARD LIGHT: OUTDOOR POLE MOUNTED FIXTURE WITH POLE AS MANUFACTURED BY GARDCO (MODEL CA4-20'H-D1-BRA) AND LIGHT MANUFACTURED BY GARDCO (FORM 10 SQUARE: A-19-1-Q-250PSMH-120-BRA).

PLAN NOTES:

1. LIGHTING IN THIS SPACE SHALL BE CONTROLLED WITH HVAC EQUIPMENT PER (16000-01)
2. INTERLOCK LIGHT SWITCH WITH EXHAUST FAN PER (16000-02)
3. EXTERIOR LIGHTING SHALL BE CONTROLLED BY SWITCH AND PHOTOCELL. WIRE SWITCH AND PHOTOCELL IN SERIES SUCH THAT PHOTOCELL OPERATES FIXTURES WHEN SWITCH IS ON.
4. CONTROL PUMP ROOM HVAC EQUIPMENT PER (16000-03)
5. CONTROL CHLORINE ROOM HVAC EQUIPMENT PER (16000-01)
6. WIRE WITH 2#10 & #10G IN 3/4"C.
7. CONTROL GENERATOR ROOM HVAC EQUIPMENT PER (16000-04)
8. WALL MOUNTED AUTOMATIC TRANSFER SWITCH.
9. WALL MOUNTED MAIN DISCONNECT SWITCH.
10. EXTERIOR UTILITY METER SOCKET.
11. EXTERIOR UTILITY CT CABINET.
12. INSTALL MOTOR CONTROL CENTER ON CONCRETE HOUSEKEEPING PAD.
13. INSTALL STANDBY ENGINE GENERATOR ON CONCRETE HOUSEKEEPING PAD PER (16622-15)
14. INSTALL ENGINE EXHAUST THROUGH WALL THIMBLE PER (16622-17) TURN EXHAUST UPWARDBEYOND ROOF-LINE AND EXTEND UP ABOVE SOFFIT. PROVIDE WEATHER CAP.
15. INSTALL NEW LIGHT POLE PER (16520-10)
16. PROIVDE CONTINUOUS BURN NIGHT LIGHT AS INDICATED.

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LIGHTING PLAN
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	30
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

100-E-01

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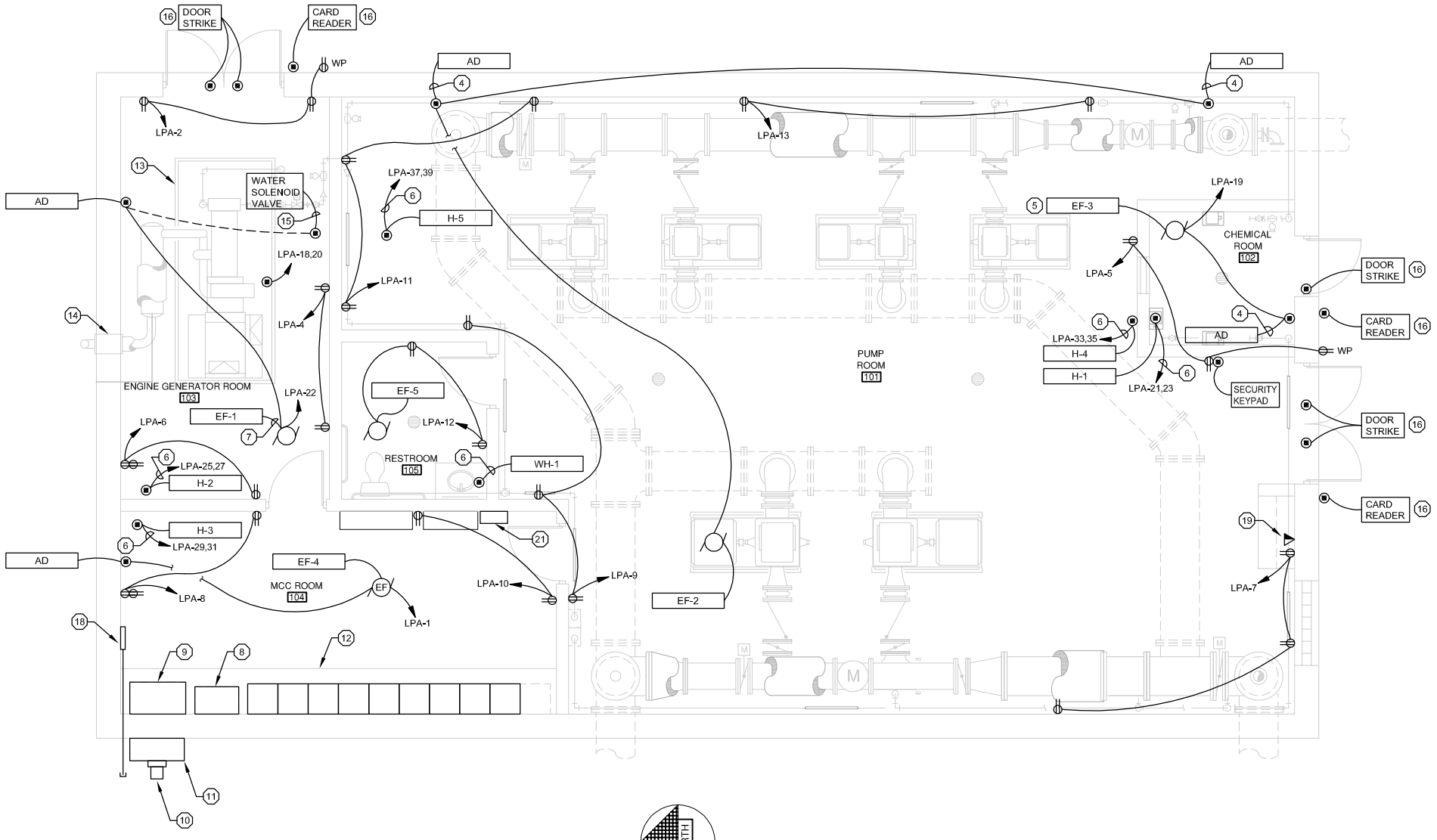

PANEL I.D.	AMPS 225	MAIN CB AMPS: 125						AIC 10,000				
LPA	PHASE 3	TYPE: 250VAC LIGHTING AND APPLIANCE PANEL						MOUNT:				
	WIRE 4							SURFACE				
	VOLTAGE 120/208											
	CIRCUIT	KVA			BREAKER		CKT	CKT	BREAKER	KVA			CIRCUIT	
TYPE	DESIGNATION	Aϕ	Bϕ	Cϕ	AMP	POLE	#	#	AMP	POLE	Aϕ	Bϕ	Cϕ	DESIGNATION	TYPE
L	LTS - 103,104,105	0.54			20	1	1	2	20	1	0.54			RECP - 103	R
L	LTS - 101 EXT.		2.24		20	1	3	4	20	1		0.36		RECP - 103	R
R	RECP - 101			0.54	20	1	5	6	20	1			0.54	RECP - 103	R
R	RECP - 101	0.54			20	1	7	8	20	1	0.54			RECP - 104	R
R	RECP - 101		0.54		20	1	9	10	20	1		0.36		RECP - 104	R
R	RECP - 101			0.54	20	1	11	12	20	1			0.36	RECP - 105	R
R	RECP - 101	0.54			20	1	13	14	20	2	1.50			WH-1	X
X	SPARE		0.00		20	1	15	16				1.50			X
X	SPARE			0.00	20	1	17	18	20	2			0.75	GEN. BLOCK HTR.	X
M	EF-3	0.60			20	1	19	20			0.75				X
E	H-1		1.50		20	2	21	22	20	1		0.50		CNTRLS-103	X
E				0.50			23	24	20	1				SPARE	E
E	H-2	2.50			30	2	25	26	20	1	0.10			FIT-1-3-1	M
E			2.50				27	28	20	1		0.10		FIT-2-4-1	M
E	H-3			2.50	30	2	29	30	20	1			0.10	AIT-3-1-1	M
E		2.50					31	32	20	1	0.40			P-3-4-1	M
E	H-4		2.50		30	2	33	34	20	1		0.10		WIT-3-4-1	M
E				2.50			35	36	20	1			0.10	FIT-5-1-1	M
E	H-5	2.50			30	2	37	38	20	1	0.40			P-5-3-1	M
E			2.50				39	40	20	1		0.10		WIT-5-3-1	M
X	SPARE			0.30	20	1	41	42	20	1			0.00	RTU-A	X
TOTAL LINE-NEUTRAL KVA		9.92	11.78	7.58			TOTAL				4.23	3.02	4.85		
TOTAL CONNECTED KVA		41.38			THIS		W/ SUB				TOTAL ESTIMATED KVA DEMAND				41.38
TOTAL CONNECT AMPS		114.66			PANEL		PANELS				TOTAL ESTIMATED AMP DEMAND				114.86

TOTALS BY TYPE		THIS PANEL	W/ SUB PANELS		
	R (RECEPTACLES)	5.40	5.40	ESTIMATED DEMAND BY TYPE	5.40
	L (LIGHTING)	3.08	3.08		3.08
	M (MOTORS)	1.90	1.90		1.90
	X	8.00	8.00		8.00
	A (AC)	0.00	0.00		0.00
	E (ELEC. HEAT)	23.00	23.00		23.00
	K (KITCHEN EQUIPMENT)	0.00	0.00		0.00

NOTES
* GFI CIRCUIT

NEC 220-56 TABLE 6 AND OVER @ 0.65 DEMAND.

ELECTRICAL POWER PLAN

SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. DO NOT SCALE DRAWINGS. IF DIMENSIONS ARE IN QUESTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING CLARIFICATION FROM ENGINEER PRIOR TO PROCEEDING WITH WORK.
2. HOMERUN WIRING SHALL BE (2)#12 & #12G UNLESS NOTED OTHERWISE.
3. ALL EXTERIOR RECEPTACLES TO BE GFCI WEATHERPROOF. MOUNT AT 30" ABOVE FINISHED GRADE.
4. ALL INTERIOR RECEPTACLES TO BE GFCI MOUNTED AT 42" AFF.
5. MOUNT EXTERIOR "H1" FIXTURE AT 9'-0" ABOVE GRADE.
6. CEILING MOUNT INTERIOR FIXTURES.
7. ROOM/AREA ATMOSPHERE REQUIREMENTS, REFER TO SECTION 16010:
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   - 7.3. TOILET ROOM: GENERAL, DRY, NEW CONSTRUCTION.
   - 7.4. CHLORINE ROOM: CORROSIVE, DAMP, NEW CONSTRUCTION.
   - 7.5. GENERATOR ROOM: GENERAL, DRY, NEW CONSTRUCTION.
8. ALL CARD READERS, DOOR SWITCHES, DOOR STRIKES, MOTIONDETECTORS, AND CAMERAS SHALL RECEIVE POWER FROM AND PROVIDE SIGNAL TO THE LONGWATCH PANEL.
9. WIRE TO LONGWATCH BOX
   - 9.1. CAMERAS
   - 9.2. MOTION DETECTORS
   - 9.3. ELECTRIC STRIKES
   - 9.4. CARD READERS
   - 9.5. SECURITY KEY PAD

PLAN NOTES:

1. LIGHTING IN THIS SPACE SHALL BE CONTROLLED WITH HVAC EQUIPMENT.
2. INTERLOCK LIGHT SWITCH WITH EXHAUST FAN PER (16000-02)
3. EXTERIOR LIGHTING SHALL BE CONTROLLED BY SWITCH AND PHOTOCELL. WIRE SWITCH AND PHOTOCELL IN SERIES SUC THAT PHOTOCELL OPERATES FIXTURES WHEN SWITCH IS ON..
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5. CONTROL CHLORINE ROOM HVAC EQUIPMENT PER (16000-01)
6. WIRE WITH 2#10 & #10G IN 3/4"C.
7. CONTROL GENERATOR ROOM HVAC EQUIPMENT PER (16000-04)
8. WALL MOUNTED AUTOMATIC TRANSFER SWITCH.
9. WALL MOUNTED MAIN DISCONNECT SWITCH.
10. EXTERIOR UTILITY METER SOCKET.
11. EXTERIOR UTILITY CT CABINET.
12. INSTALL MOTOR CONTROL CENTER ON CONCRETE HOUSEKEEPING PAD.
13. INSTALL STANDBY ENGINE GENERATOR ON CONCRETE HOUSEKEEPING PAD PER (16622-15)
14. INSTALL ENGINE EXHAUST THROUGH WALL THIMBLE PER (16622-17) TURN EXHAUST UPWARDBEYOND ROOF-LINE AND EXTEND UP ABOVE SOFFIT. PROVIDE WEATHER CAP.
15. CONNECT WATER SOLENOID VALVE TO GENERATOR CONTROL PANEL. WIRE PER GENERATOR MANUFACTURERS INSTRUCTIONS.
16. CARD ACCESS SYSTEM. VON DUPRIN ELECTRIC STRIKE #6211 (12 VOLT DC), CONTROLLED BY HID PROXPRO MODEL 5352 AGN. INSTALL PER MANUFACTURERS SPECIFICATIONS. CARD READER HEIGHT = 2'-9" AFG. CONTRACTOR TO WIRE BACK TO LONGWATCH BOX. PROVIDE 2 ADDITIONAL CARD READERS AND ELECTRIC STRIKES AND 1 ADDITIONAL CAMERA.
17. NOT USED.
18. TELCO INTERFACE EQUIPMENT BY OWNER WITH 2" C. STUBBED OUT FOR SERVICE ENTRANCE.
19. OUTLET FOR FUTURE TELEPHONE JACK AND LONGWATCH RJ-45 JACK. PROVIDE 3/4" C. TO TELCO INTERFACE. PROVIDE 3/4"C AND CAT6 CABLE TO LONGWATCH CABINET IN MCC ROOM.
20. NOT USED.
21. LONGWATCH CABINET, FURNISHED AND INSTALLED BY OWNER. PROVIDE 120V, 20 AMP CIRCUIT FROM PANEL LPA. CONTRACTOR TO PROVIDE CONDUIT FROM LOGWATCH BOX TO SCADA SUB-PANEL.
22. PROVIDE BATTERY BACK-UP FOR RTU-A LONGWATCH RADIO (IN RTU-A BOX).

SA. ST. W. G. E. T. I. TS. PP.

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ELECTRICAL POWER PLAN
IN: PUETZ ROAD BOOSTER STATION

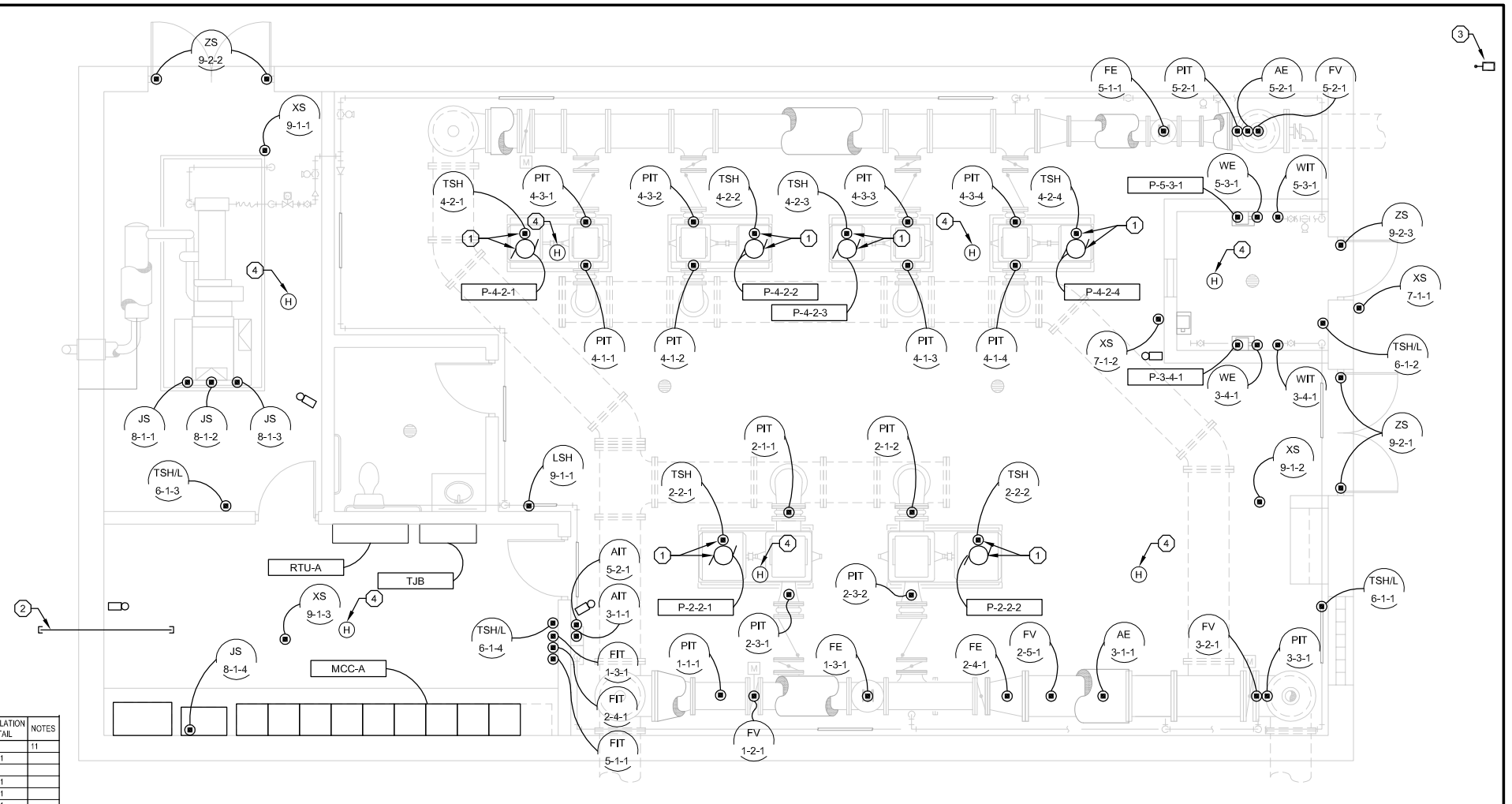
FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	31
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

100-E-02

File: R:\9900\4931\4931001\dwg\E2 ELECTRICAL PLAN.dwg
Plot Date: Aug 13, 2009 - 2:47pm
LAYOUT:
PLAN VIEW: PLAN



TAG NUMBER	DEVICE DESCRIPTION	FIRST SIGNAL/CONTROL HOMERUN			SECOND SIGNAL/CONTROL HOMERUN			POWER HOMERUN				INSTALLATION DETAIL	NOTES
		DESTINATION	WIRING TYPE	WIRING	DESTINATION	WIRING TYPE	WIRING	CIRCUIT	VOLTAGE	CKT. BKR.	WIRING		
LT-1-1-1	EXISTING RESERVOIR LEVEL TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1									11
PIT-1-1-1	GROUND STORAGE RESERVOIR PRESSURE TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1								16930-51	
FV-1-2-1	GROUND STORAGE RESERVOIR CONTROL VALVE	TJB-A	120VAC DISCRETE SIGNAL	D16				MCC-A	480/3	15A/3P	3#12 & #12G		
FIT-1-3-1	GROUND STORAGE RESERVOIR FLOW TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1	TJB-A	120VAC DISCRETE SIGNAL	D2	LPA (26)	120/1	20A/1P	2#12 & #12G	16990-01	
FE-1-3-1	GROUND STORAGE RESERVOIR FLOW METER	FIT-1-1-3	MFG SIGNAL CABLE	M1								16910-51	
PIT-2-1-1	LOWER ZONE BOOSTER PUMP NO.1 INLET PRESSURE TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1								16930-51	
PIT-2-1-2	LOWER ZONE BOOSTER PUMP NO.2 INLET PRESSURE TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1								16930-51	
TSH-2-2-1	LOWER ZONE BOOSTER PUMP NO.1 MOTOR HIGH TEMPERATURE SENSOR	MCC-A	120VAC DISCRETE SIGNAL	D2									
TSH-2-2-2	LOWER ZONE BOOSTER PUMP NO.2 MOTOR HIGH TEMPERATURE SENSOR	MCC-A	120VAC DISCRETE SIGNAL	D2									
PIT-2-3-1	LOWER ZONE BOOSTER PUMP NO.1 OUTLET PRESSURE TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1								16930-51	
PIT-2-3-2	LOWER ZONE BOOSTER PUMP NO.2 OUTLET PRESSURE TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1								16930-51	
FIT-2-4-1	LOWER ZONE BOOSTER PUMP OUTLET FLOW TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1	TJB-A	120VAC DISCRETE SIGNAL	D2	LPA (26)	120/1	20A/1P	2#12 & #12G	16990-01	
FE-2-4-1	LOWER ZONE BOOSTER PUMP OUTLET FLOW METER	FIT-2-4-1	MFG SIGNAL CABLE	M1								16910-51	
FV-2-5-1	LOWER ZONE BOOSTER PUMP OUTLET CONTROL VALVE	TJB-A	120VAC DISCRETE SIGNAL	D16				MCC-A	480/3	15A/3P	3#12 & #12G		
AIT-3-1-1	LOWER ZONE CHLORINE RESIDUAL ANALYZER	TJB-A	24VDC ANALOG SIGNAL	A1	TJB-A	120VAC DISCRETE SIGNAL	D6	LPA (30)	120/1	20A/1P	2#12 & #12G		1
AE-3-1-1	LOWER ZONE CHLORINE RESIDUAL SENSOR	AIT-3-1-1	MFG SIGNAL CABLE	M1									1
FV-3-2-1	GROUND STORAGE RESERVOIR CONTROL VALVE	TJB-A	120VAC DISCRETE SIGNAL	D16				MCC-A	480/3	15A/3P	3#12 & #12G		
PIT-3-3-1	LOWER ZONE PRESSURE TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1								16930-51	
P-3-4-1	UPPER ZONE CHLORINE FEED PUMP	TJB-A	24VDC ANALOG SIGNAL	A1	TJB-A	120VAC DISCRETE SIGNAL	D6	LPA (32)	120/1	20A/1P	2#12 & #12G		2
WIT-3-4-1	LOWER ZONE CHLORINE DRUM WEIGH SCALE TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1	TJB-A	120VAC DISCRETE SIGNAL	D4	LPA (34)	120/1	20A/1P	2#12 & #12G		3
WE-3-4-1	LOWER ZONE CHLORINE DRUM WEIGH SCALE	WIT-3-4-1	MFG SIGNAL CABLE	M1									3
PIT-4-1-1	UPPER ZONE BOOSTER PUMP NO.1 INLET PRESSURE TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1								16930-51	
PIT-4-1-2	UPPER ZONE BOOSTER PUMP NO.2 INLET PRESSURE TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1								16930-51	
PIT-4-1-3	UPPER ZONE BOOSTER PUMP NO.3 INLET PRESSURE TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1								16930-51	
PIT-4-1-4	UPPER ZONE BOOSTER PUMP NO.4 INLET PRESSURE TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1								16930-51	
TSH-4-2-1	UPPER ZONE BOOSTER PUMP NO.1 MOTOR HIGH TEMPERATURE SENSOR	MCC-A	120VAC DISCRETE SIGNAL	D2									
TSH-4-2-2	UPPER ZONE BOOSTER PUMP NO.2 MOTOR HIGH TEMPERATURE SENSOR	MCC-A	120VAC DISCRETE SIGNAL	D2									
TSH-4-2-3	UPPER ZONE BOOSTER PUMP NO.3 MOTOR HIGH TEMPERATURE SENSOR	MCC-A	120VAC DISCRETE SIGNAL	D2									
TSH-4-2-4	UPPER ZONE BOOSTER PUMP NO.4 MOTOR HIGH TEMPERATURE SENSOR	MCC-A	120VAC DISCRETE SIGNAL	D2									
PIT-4-3-1	UPPER ZONE BOOSTER PUMP NO.1 OUTLET PRESSURE TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1								16930-51	
PIT-4-3-2	UPPER ZONE BOOSTER PUMP NO.2 OUTLET PRESSURE TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1								16930-51	
PIT-4-3-3	UPPER ZONE BOOSTER PUMP NO.3 OUTLET PRESSURE TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1								16930-51	
PIT-4-3-4	UPPER ZONE BOOSTER PUMP NO.4 OUTLET PRESSURE TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1								16930-51	
FE-5-1-1	UPPER ZONE BOOSTER PUMP OUTLET FLOW METER	FIT-5-1-1	MFG SIGNAL CABLE	M1								16910-51	
FIT-5-1-1	UPPER ZONE BOOSTER PUMP OUTLET FLOW TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1	TJB-A	120VAC DISCRETE SIGNAL	D2	LPA (36)	120/1	20A/1P	2#12 & #12G	16990-01	
FV-5-2-1	UPPER ZONE CONTROL VALVE	TJB-A	120VAC DISCRETE SIGNAL	D16				MCC-A	480/3	15A/3P	3#12 & #12G		
AIT-5-2-1	UPPER ZONE CHLORINE RESIDUAL ANALYZER	TJB-A	24VDC ANALOG SIGNAL	A1	TJB-A	120VAC DISCRETE SIGNAL	D6	LPA (30)	120/1	20A/1P	2#12 & #12G		1
AE-5-2-1	UPPER ZONE CHLORINE RESIDUAL SENSOR	AIT-5-2-1	MFG SIGNAL CABLE	M1									1
PIT-5-2-1	UPPER ZONE PRESSURE TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1								16930-51	
P-5-3-1	UPPER ZONE CHLORINE FEED PUMP	TJB-A	24VDC ANALOG SIGNAL	A1	TJB-A	120VAC DISCRETE SIGNAL	D6	LPA (38)	120/1	20A/1P	2#12 & #12G		2
WIT-5-3-1	UPPER ZONE CHLORINE DRUM WEIGH SCALE TRANSMITTER	TJB-A	24VDC ANALOG SIGNAL	A1	TJB-A	120VAC DISCRETE SIGNAL	D4	LPA (40)	120/1	20A/1P	2#12 & #12G		3
WE-5-3-1	UPPER ZONE CHLORINE DRUM WEIGH SCALE	WIT-5-3-1	MFG SIGNAL CABLE	M1									3
TSH/L-6-1-1	PUMP ROOM HIGH/LOW TEMPERATURE SWITCH	TJB-A	120VAC DISCRETE SIGNAL	D4								16990-01	7
TSH/L-6-1-2	CHEMICAL ROOM HIGH/LOW TEMPERATURE SWITCH	TJB-A	120VAC DISCRETE SIGNAL	D4								16990-01	7
TSH/L-6-1-3	GEN. ROOM HIGH/LOW TEMPERATURE SWITCH	TJB-A	120VAC DISCRETE SIGNAL	D4								16990-01	7
TSH/L-6-1-4	MCC ROOM HIGH/LOW TEMPERATURE SWITCH	TJB-A	120VAC DISCRETE SIGNAL	D4								16990-01	7
XS-7-1-1	CHEMICAL ROOM EXTERIOR HVAC CONTROL STATION (START-STOP-RUN)	TJB-A	120VAC DISCRETE SIGNAL	D6									6
XS-7-1-2	CHEMICAL ROOM INTERIOR HVAC CONTROL STATION (START-STOP-RUN)	TJB-A	120VAC DISCRETE SIGNAL	D6									6
JS-8-1-1	GENERATOR RUN RELAY	TJB-A	120VAC DISCRETE SIGNAL	D2									4
JS-8-1-2	GENERATOR FAIL RELAY	TJB-A	120VAC DISCRETE SIGNAL	D2									4
JS-8-1-3	GENERATOR EXERCISE RELAY	TJB-A	120VAC DISCRETE SIGNAL	D2									4
JS-8-1-4	AUTOMATIC TRANSFER SWITCH NORMAL POSITION RELAY	TJB-A	120VAC DISCRETE SIGNAL	D2									5
XS-9-1-1	PUMP ROOM INTRUSION MOTION DETECTOR	TJB-A	120VAC DISCRETE SIGNAL	D4									10
XS-9-1-2	GEN. ROOM INTRUSION MOTION DETECTOR	TJB-A	120VAC DISCRETE SIGNAL	D4									10
XS-9-1-3	MCC ROOM INTRUSION MOTION DETECTOR	TJB-A	120VAC DISCRETE SIGNAL	D4									10
LSH-9-1-1	PUMP ROOM FLOOD SWITCH	TJB-A	120VAC DISCRETE SIGNAL	D2								16990-05	
ZS-9-2-1	PUMP ROOM DOOR SWITCH	TJB-A	120VAC DISCRETE SIGNAL	D4									10
ZS-9-2-2	GEN. ROOM DOOR SWITCH	TJB-A	120VAC DISCRETE SIGNAL	D4									10
ZS-9-2-3	MCC ROOM DOOR SWITCH	TJB-A	120VAC DISCRETE SIGNAL	D4									10
TJB	TERMINAL JUNCTION BOX	MCC-A	24VDC ANALOG SIGNAL	A10	MCC-A	120VAC DISCRETE SIGNAL	D96						8,9
RTU-A	SCADA SYSTEM CONTROL PANEL	TJB-A	24VDC ANALOG SIGNAL		TJB-A	120VAC DISCRETE SIGNAL		LPA (42)	120/1	20A/1P	2#12 & #12G		10

NOTES:
1. INSTALL CONDUIT, BOX, AND MANUFACTURER SUPPLIED CABLING FOR CHLORINE RESIDUAL ANALYZER IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. INSTALL CONDUIT, RECEPTACLE, POWER WIRING, AND SIGNAL WIRING FOR FUTURE CHEMICAL FEED PUMP. INTERLOCK DEDICATED SIMPLEX OUTLET WITH SIGNAL WIRING FROM MCC-A.
3. INSTALL CONDUIT AND BOX FOR FUTURE WEIGH SCALE.
4. COORDINATE TERMINATIONS AND CONFIGURATION OF PROGRAMMABLE RELAYS LOCATED WITHIN GENERATOR CONTROL PANEL WITH GENERATOR MANUFACTURER.
5. COORDINATE TERMINATIONS AND CONFIGURATION OF PROGRAMMABLE RELAY LOCATED WITHIN AUTOMATIC TRANSFER SWITCH WITH GENERATOR MANUFACTURER.
6. PROVIDE WEATHERPROOF, LOCKABLE EXTERIOR ENCLOSURE FOR CONTROL STATION.
7. SYMBOL IDENTIFIES LOCATION FOR TWO TEMPERATURE SENSORS. INSTALL SENSORS ADJACENT TO ONE ANOTHER AND COMBINE SIGNAL WIRING INTO A SINGLE CONDUIT.
8. PROVIDE 1"C FOR ETHERNET DATA CABLING FROM MCC-A.
9. INSTALL TERMINAL JUNCTION BOX AND TERMINATE ALL FIELD WIRING. COIL SUFFICIENT AFD COMMUNICATION ETHERNET CABLE IN TJB TO EXTEND TO RTU-A.
10. RTU-A PROVIDED AND INSTALLED BY OTHERS ALONG WITH ALL SIGNAL WIRING TO TJB. EC TO PROVIDE 120V CONNECTION AS SHOWN.

NORTH

PROCESS INSTRUMENTATION PLAN
SCALE: 1/4" = 1'-0"

PLAN NOTES:
1. INSTALL MOTOR AND TEMPERATURE SWITCH CONNECTIONS PER (16111-03)
2. INSTALL (2) 3" C. FROM RTU-A TO RESERVOIR, THEN A MINIMUM OF 10' UP SIDE OF RESERVOIR TO EXISTING ANTENNA LOCATION. PULL EXISTING ANTENNA CABLE INNEW CONDUITS TO RTU-A, REFER TO SITE PLAN.
3. INSTALL 1" C. FROM LIGHT POLE TO RTU-A FOR SECURITY CAMERA CABLE. INSTALL 2 SECURITY CAMERAS AND CABLE TO LONGWATCH BOX THROUGH RTU-A.
4. HEAT DETECTOR TO BE CONNECTED TO CONTROL PANEL TJB. HEAT DETECTORS WILL BE POWERED FROM RTU-A.
5. PUMP ROOM FLOOD SWITCH SHALL BE CONSOLIDATED ELECTRIC MODEL 101G OR EQUAL.

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TS.
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D.A.M.	8/13/09	R.L.B.	8/13/09	K.A.K.	8/13/09

PROCESS INSTRUMENTATION PLAN
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	32
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

100-E-02

PLAN VIEW: PLAN
LAYOUT: LAYOUT
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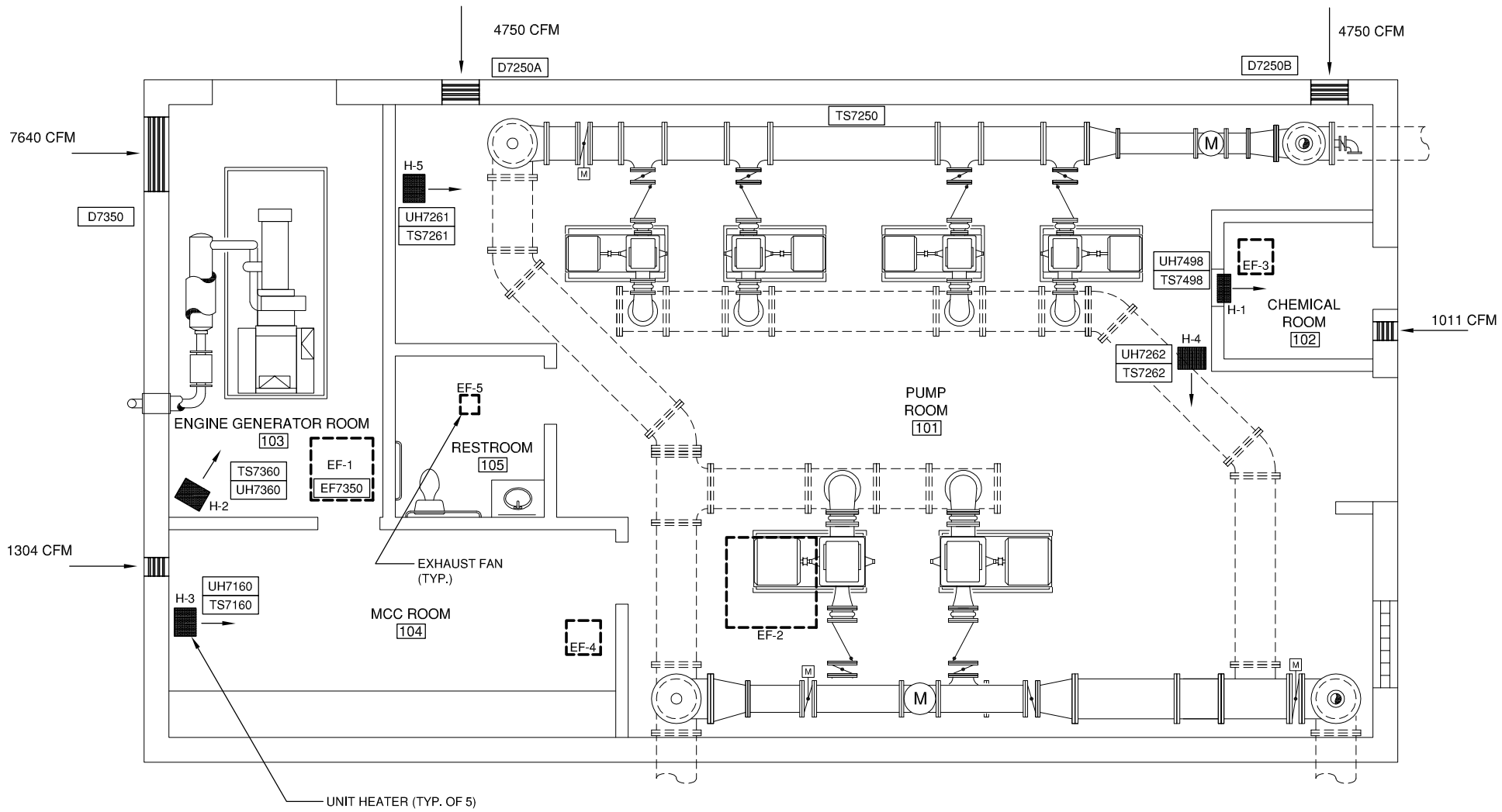

NORTH

HVAC PLAN

SCALE: 1/4" = 1'-0"

ELECTRIC UNIT HEATERS

UNIT NO.	SERVICE	TYPE	CAP KW	AIR VOL. CFM	MOTOR WATTS	INTEGRAL STAT	MANUF. MODEL
H-2	GENERATOR RM	HORIZ.	5	270	6.00	NO (1)	BERKO HUH-520SA
H-3	MCC ROOM	HORIZ.	5	270	6.0	NO (1)	BERKO HUH-520SA
H-4/-5	PUMP ROOM	HORIZ.	5	270	6.0	NO (1)	BERKO HUH-520SA

(1) EXTERNAL THERMOSTAT KIT

ELECTRIC WALL HEATERS

UNIT NO.	SERVICE	W	H	D	CAP. WATTS	CAP. BTU	RECESS	INTEGRAL STAT	MANUF. MODEL
H-1	CHEMICAL	15 25/32"	19 3/16"	3 3/4"	3000	10,239	YES	YES	GREENHECK SP-200

CEILING EXHAUST FANS

UNIT NO.	SERVICE	CFM OF STD. AIR	TYPE	MAX SONES	EXT. S.P. IN IN. H2O	MOTOR WATTS	MOTOR RPM	SOLID STATE SPEED CONTROLLER	MANUF. MODEL
	BATHROOM	100	CEILING	4	0'-0 1/2"	173	2.20	NONE	GREENHECK SP-200

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HVAC PLAN
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE

APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	33
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

100-H-01

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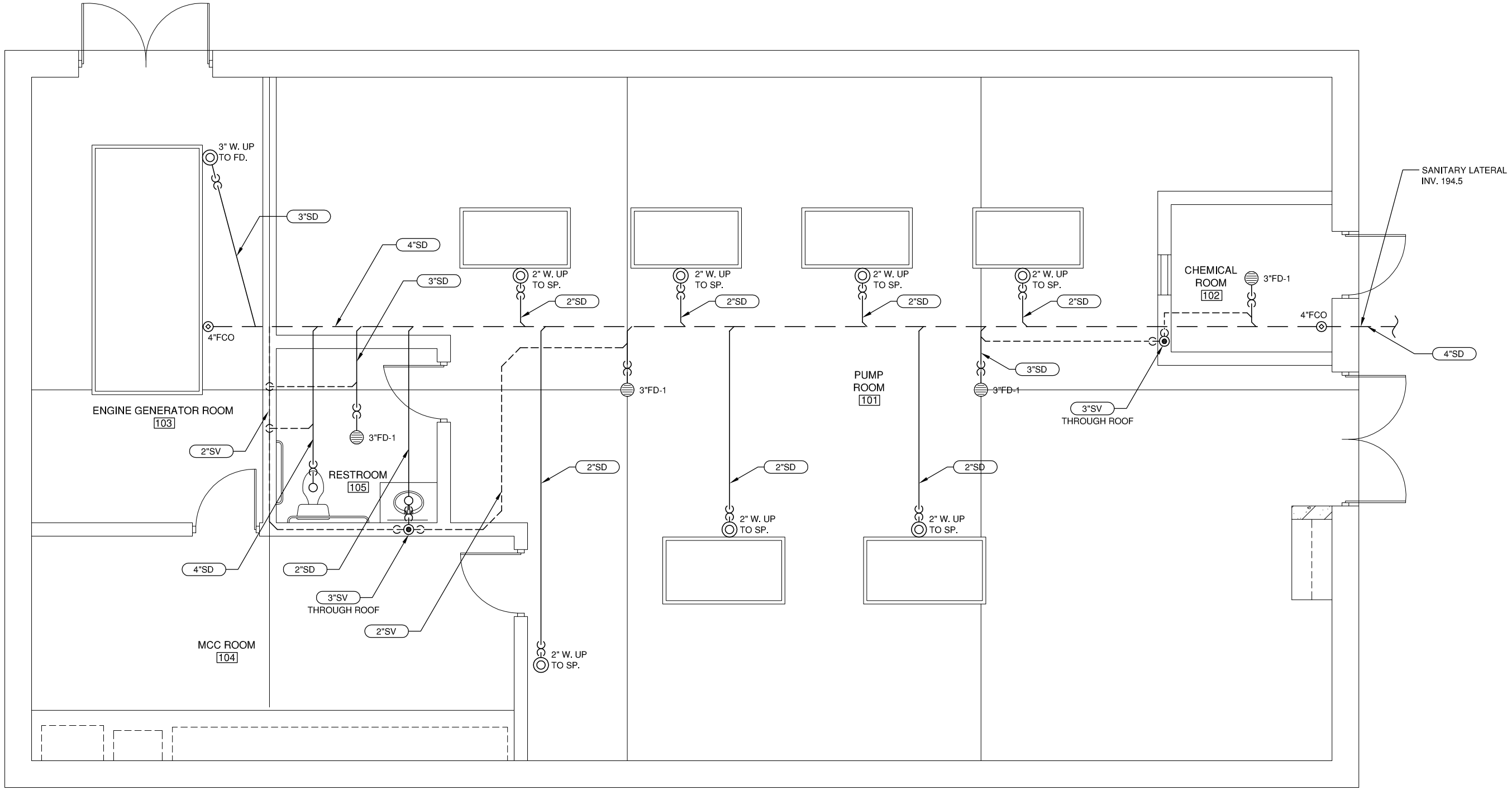

NORTH

PLUMBING PLAN

SCALE: 3/8" = 1'-0"

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SANITARY DRAIN AND VENT PLAN

IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE

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CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	34
PROFILE HOR. N.T.S. VER. N.T.S.	OF 53

100-P-01

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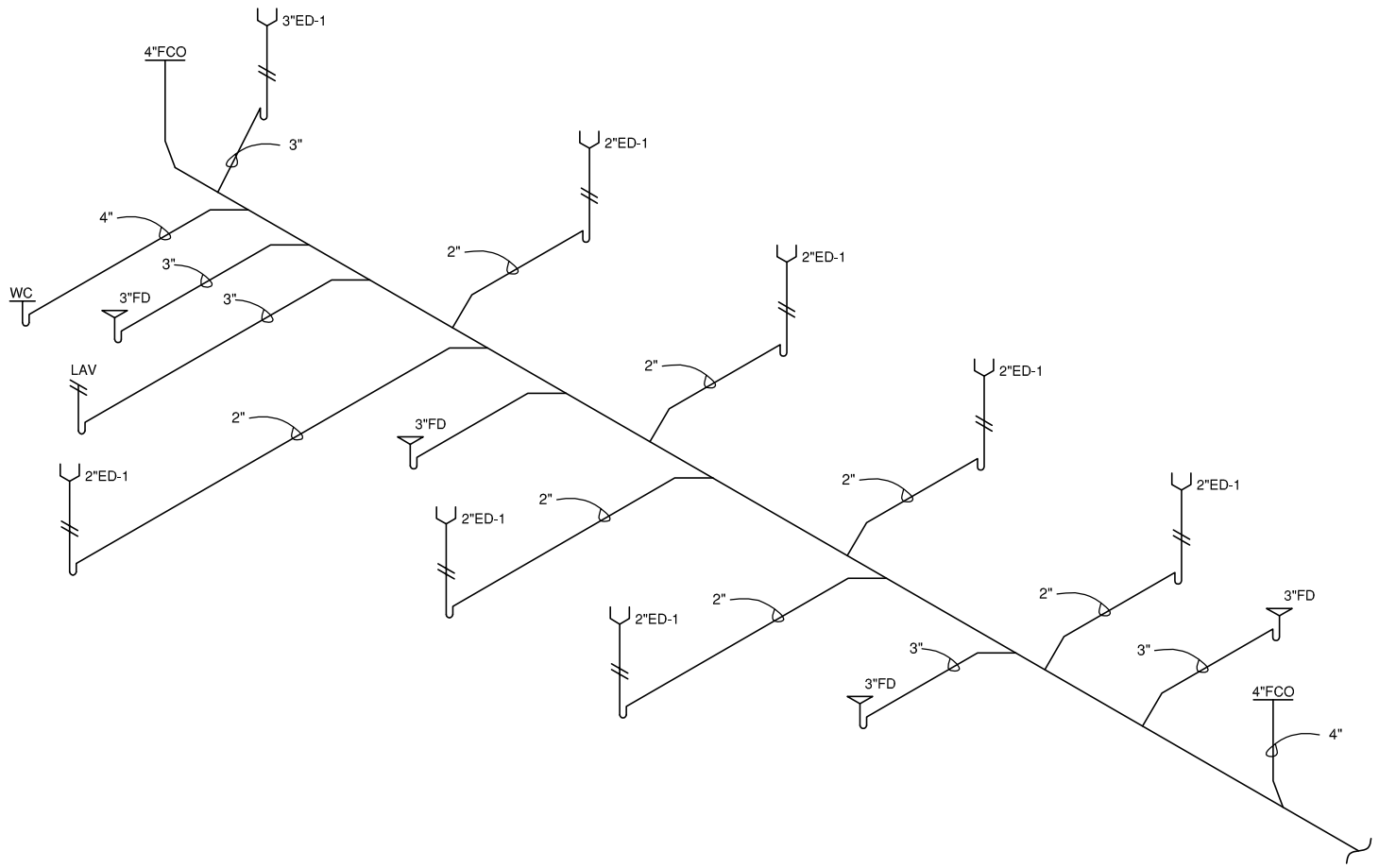

DRAIN AND VENT ISOMETRIC

GENERAL NOTES:

1. EXISTING EQUIPMENT LOCATIONS AND PIPE ROUTING ARE FOR REFERENCE ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETAILED SITE INVESTIGATION AND IS RESPONSIBLE FOR MINOR MODIFICATIONS REQUIRED BY EXISTING CONDITIONS. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR EXACT PIPE ROUTING AND INSTALLATION REQUIREMENTS DUE TO SITE CONDITIONS. NO ADDITIONAL CONTRACT COST WILL BE ALLOWED DUE TO A FAILURE OF THE CONTRACTOR TO ADEQUATELY IDENTIFY CONDITIONS THAT MAY AFFECT HIS WORK.
2. DO NOT SCALE DRAWING. INSTALL THE FIXTURES TO THE ROUGHING-IN DIMENSIONS SHOWN ON THE ARCHITECTURAL PLANS. IF DIMENSIONS ARE IN QUESTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING CLARIFICATION BEFORE CONTINUING WITH CONSTRUCTION. ALL LOCATIONS ARE APPROXIMATE AND SHOULD BE FIELD VERIFIED. COORDINATE WITH OWNER AND FIELD ENGINEER.
3. THE CONTRACTOR SHALL VERIFY ACTUAL PIPING LENGTHS AND SIZES.
4. ALL PIPES, FITTINGS, AND CONNECTIONS SHALL BE WATER TIGHT.
5. CONTRACTOR SHALL REVIEW ENTIRE PLANS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION AND DETAILS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL REQUIREMENTS REQUIRED HEREIN.
6. CONTRACTORS SHALL BE QUALIFIED PROFESSIONALS. ALL WORK SHALL BE INSTALLED IN A WORKMANLIKE MANNER. ALL WORK SHALL COMPLY WITH ALL RELEVANT CODES, REGULATIONS, AND GUIDANCES.
7. CONTRACTOR SHALL COORDINATE INSTALLATION OF ALL PIPING, FIXTURES, AND EQUIPMENT WITH ALL DISCIPLINES TO ELIMINATE CONFLICTS. DO NOT INSTALL ANY PIPING OR DEVICES ABOVE ELECTRICAL PANELS.
8. ALL PENETRATIONS SHALL BE SUPPORTED, SEALED, AND FIRESTOPPED TO MATCH THE ORIGINAL FIRE RATING OF THE STRUCTURE PENETRATED.
9. PLUMBING CONTRACTOR SHALL COORDINATE THE LOCATION OF ALL WATER DISTRIBUTION PIPING IN THE CEILINGS WITH THE ELECTRICAL LIGHT FIXTURES AND HVAC DUCT WORK AND PIPING.
10. PLUMBING CONTRACTOR SHALL COORDINATE THE LOCATIONS OF ALL FLOOR DRAINS AND SIGHT DRAINS IN MECHANICAL ROOMS WITH THE MECHANICAL CONTRACTOR.

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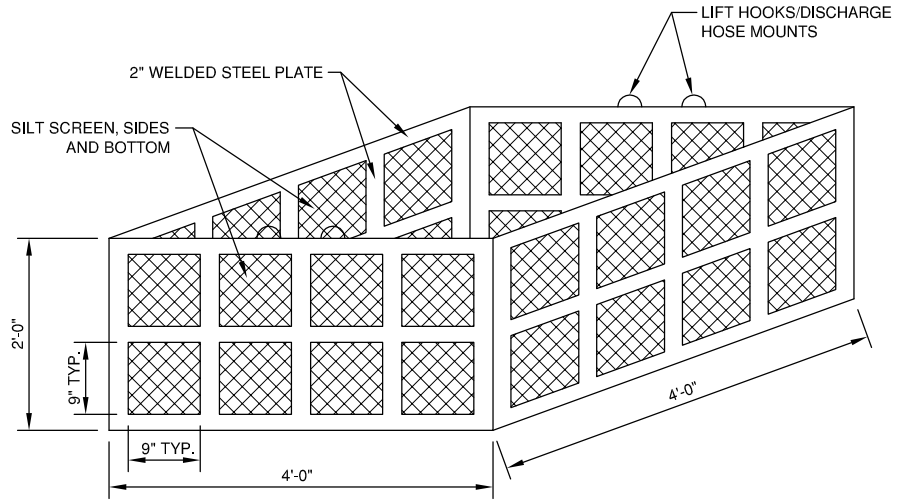
SANITARY WASTE AND VENT PIPING ISOMETRIC
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

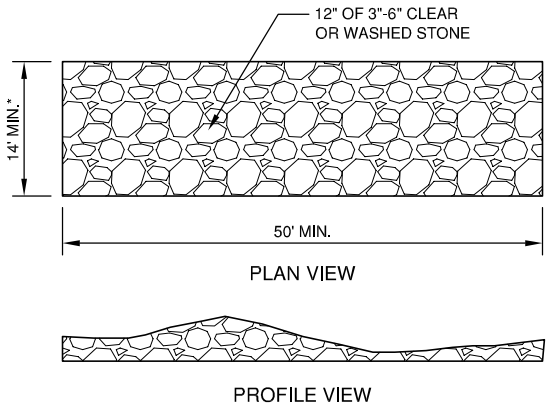
APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	35
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

100-P-02



SEDIMENTATION CONTROL BASKET
(IF APPLICABLE)



*14' MIN. OR FULL WIDTH OF THE EGRESS POINT.
REFERENCE WDNR TECHNICAL STANDARD 1057.

TRACKING PAD DETAIL
(IF APPLICABLE)

INLET PROTECTION NOTES:

MANUFACTURED ALTERNATIVES APPROVED AND LISTED ON THE WDOT PRODUCT ACCEPTABILITY LIST MAY BE SUBSTITUTED.

WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT THE SEDIMENT TRAPPED ON THE GEOTEXTILE FABRIC DOES NOT FALL INTO THE INLET. ANY MATERIAL FALLING INTO THE INLET SHALL BE REMOVED IMMEDIATELY.

① FINISHED SIZE, INCLUDING FLAP POCKETS WHERE REQUIRED, SHALL EXTEND A MINIMUM OF 10" AROUND THE PERIMETER TO FACILITATE MAINTENANCE OR REMOVAL.

② FOR INLET PROTECTION, TYPE C (WITH CURB BOX), AN ADDITIONAL 18" OF FABRIC IS WRAPPED AROUND THE WOOD AND SECURED WITH STAPLES. THE WOOD SHALL NOT BLOCK THE ENTIRE HEIGHT OF THE CURB BOX OPENING.

③ FLAP POCKETS SHALL BE LARGE ENOUGH TO ACCEPT WOOD 2"X4".

INSTALLATION NOTES:
TYPE "B" & "C"

TRIM EXCESS FABRIC IN THE FLOW LINE TO WITHIN 3" OF THE GRATE.

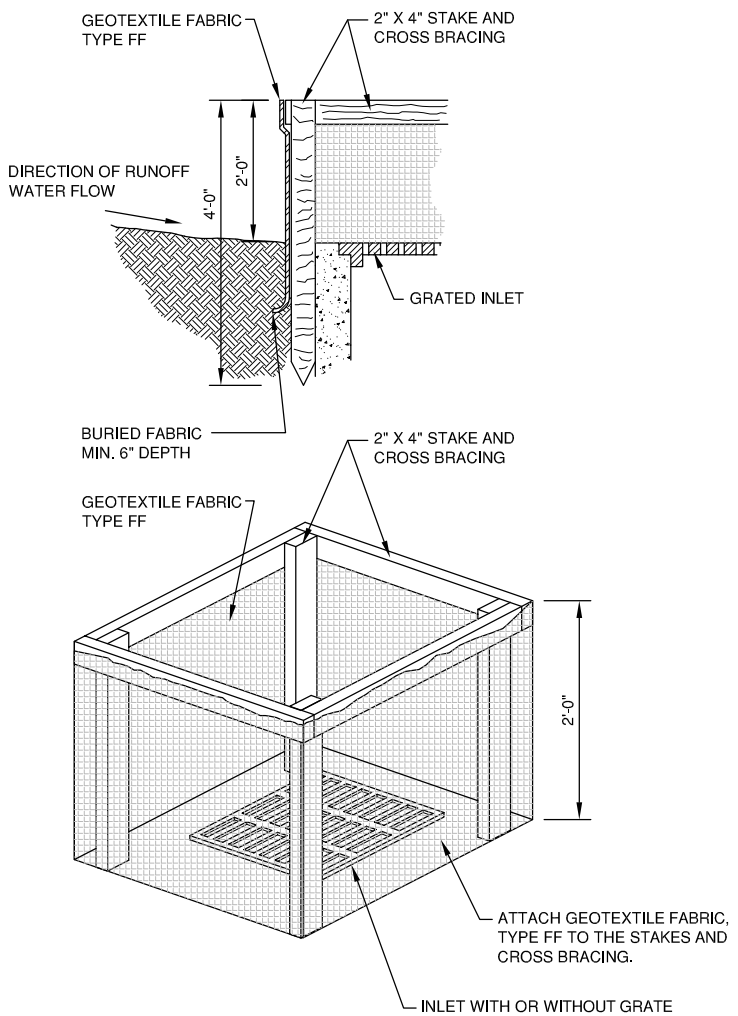
THE CONTRACTOR SHALL DEMONSTRATE A METHOD OF MAINTENANCE, USING A SEWN FLAP, HAND HOLDS OR OTHER METHOD TO PREVENT ACCUMULATED SEDIMENT FROM ENTERING THE INLET.

TYPE "D"

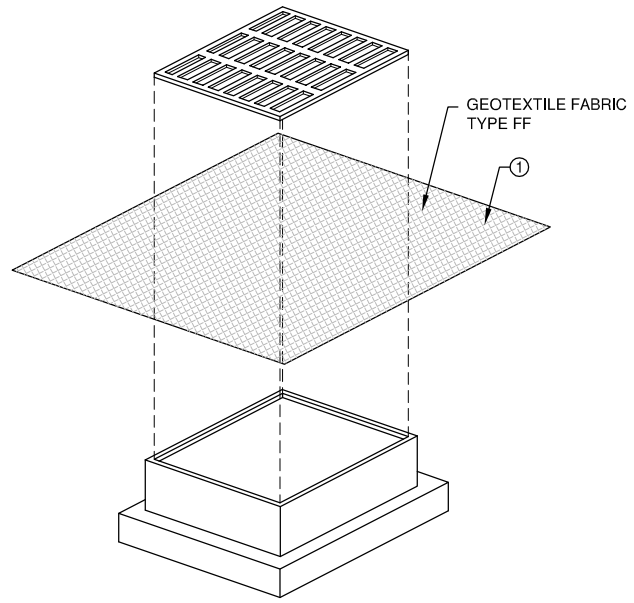
DO NOT INSTALL INLET PROTECTION TYPE D IN INLETS SHALLOWER THAN 30" MEASURED FROM THE BOTTOM OF THE INLET TO THE TOP OF THE GRATE.

TRIM EXCESS FABRIC IN THE FLOW LINE TO WITHIN 3" OF THE GRATE.

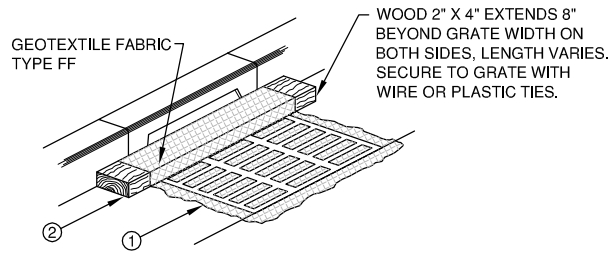
THE INSTALLED BAG SHALL HAVE A MINIMUM SIDE CLEARANCE, BETWEEN THE INLET WALLS AND THE BAG, MEASURED AT THE BOTTOM OF THE OVERFLOW HOLES, OF 3". WHERE NECESSARY THE CONTRACTOR SHALL CINCH THE BAG, USING PLASTIC ZIP TIES, TO ACHIEVE THE 3" CLEARANCE, THE TIES SHALL BE PLACED AT THE MAXIMUM OF 4" FROM THE BOTTOM OF THE BAG.



INLET PROTECTION, TYPE A



INLET PROTECTION, TYPE B
(WITHOUT CURB BOX)
(CAN BE INSTALLED IN ANY INLET WITHOUT A CURB BOX)



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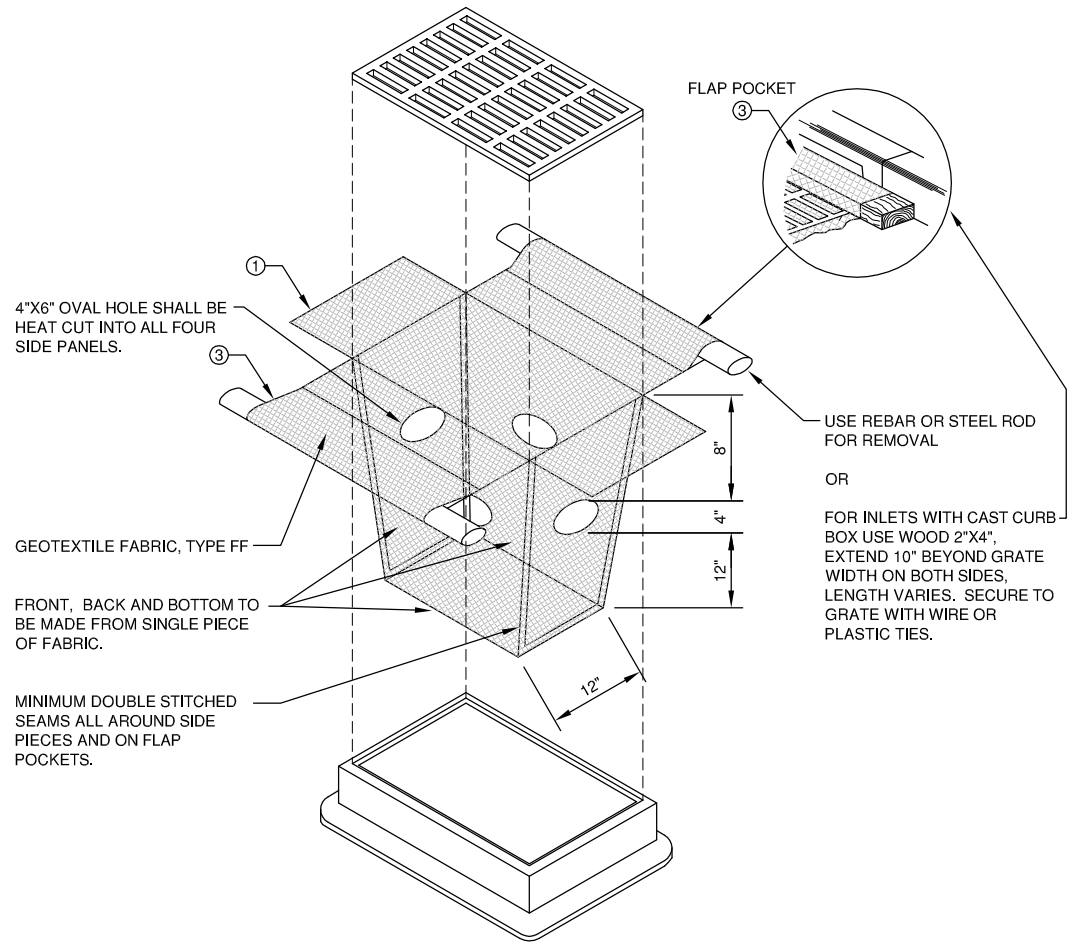
(WITH CURB BOX)



INLET PROTECTION, TYPE D
(CAN BE INSTALLED IN ANY INLET TYPE WITH OR WITHOUT CURB BOX AS PER NOTE "2")

SA.
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T.
I.
TS.
PP.

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REVISION BY | DATE

CITY OF OAK CREEK, WISCONSIN

DESIGNED BY	DATE	DRAWN BY	DATE	CHECKED BY	DATE
D.A.M.	8/13/09	R.L.B.	8/13/09	K.A.K.	8/13/09

EROSION CONTROL DETAILS
INLET PROTECTION
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	36
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

200-C-01

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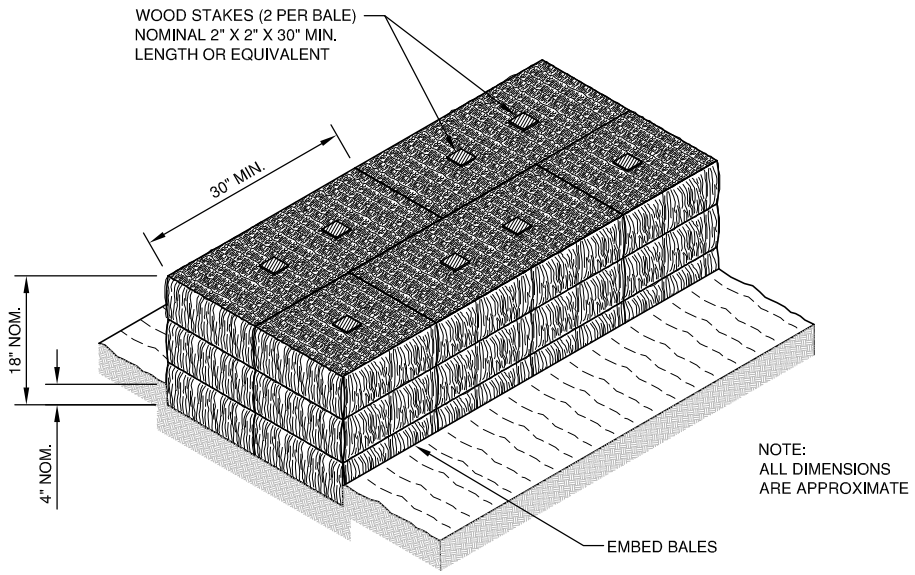
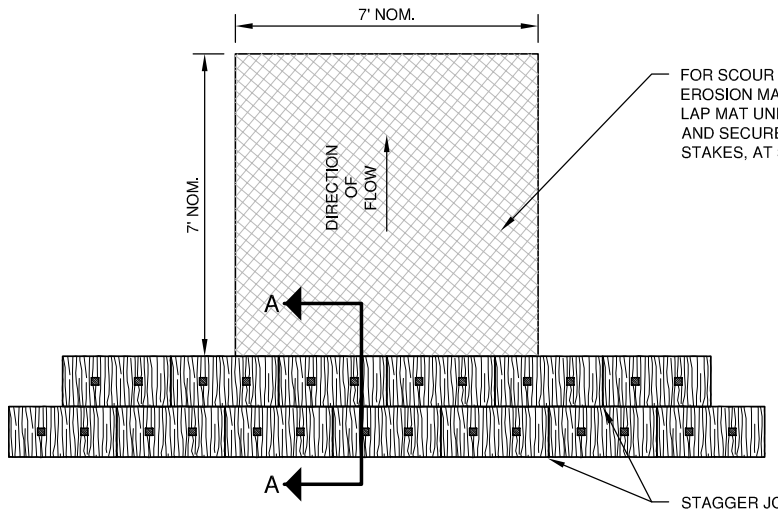
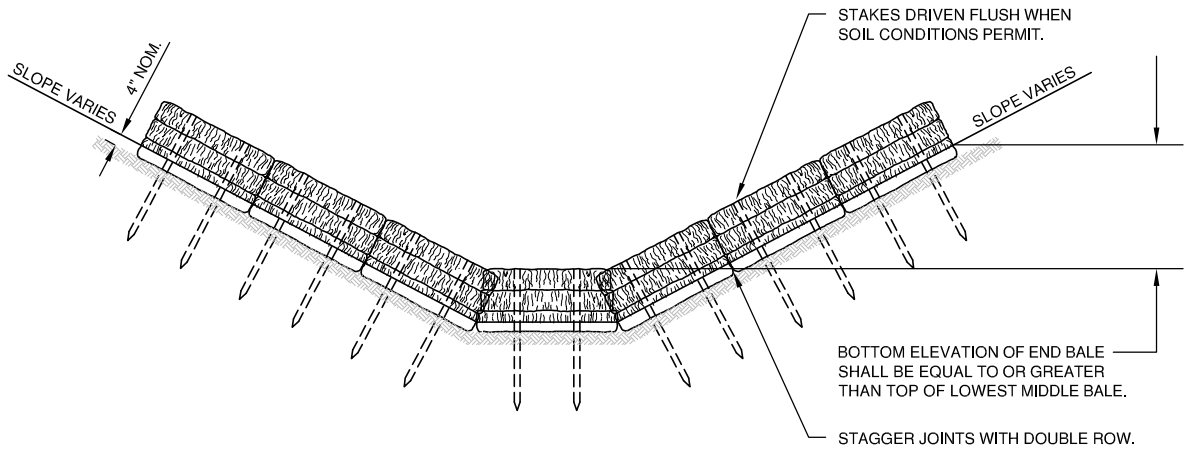


SECTION A-A

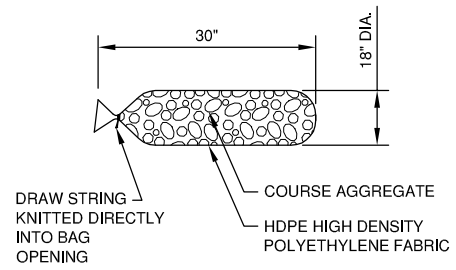


PLAN VIEW



FRONT ELEVATION

TEMPORARY DITCH CHECK USING EROSION BALES TYPE A



FILTER BAG DETAIL

COURSE AGGREGATE INFORMATION

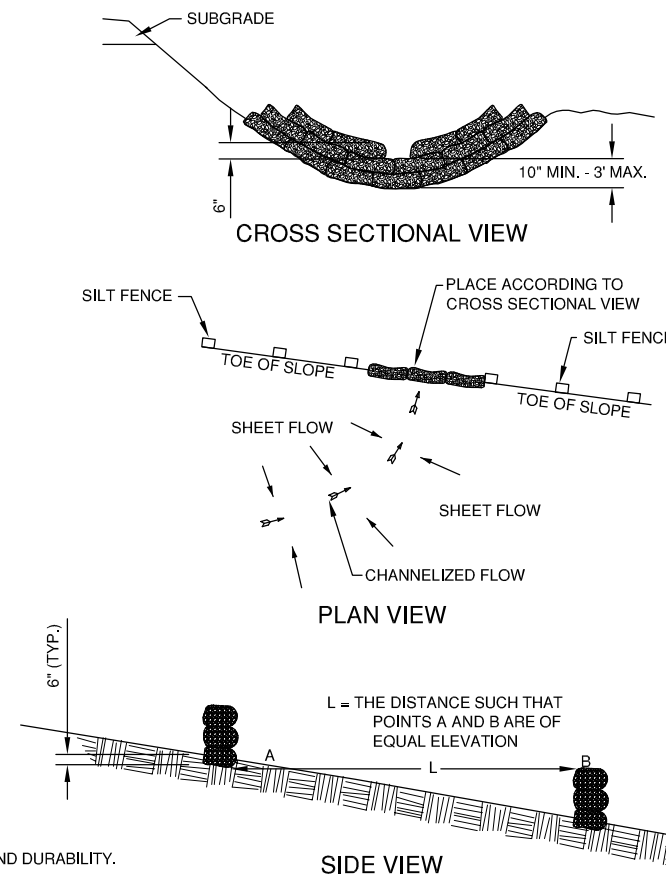
SIEVE SIZE	SIZE NO. AASHTO No. 67 (1)
2 INCH (50 mm)	-
1 1/2 INCH (37.5mm)	-
1 INCH (25.0 mm)	100
3/4 INCH (19.0mm)	90-100
3/8 INCH (9.5mm)	20-55
No. 4 (4.75mm)	0-10
No. 8 (2.36mm)	0-5

(1) SIZE No. ACCORDING TO AASHTO M 43

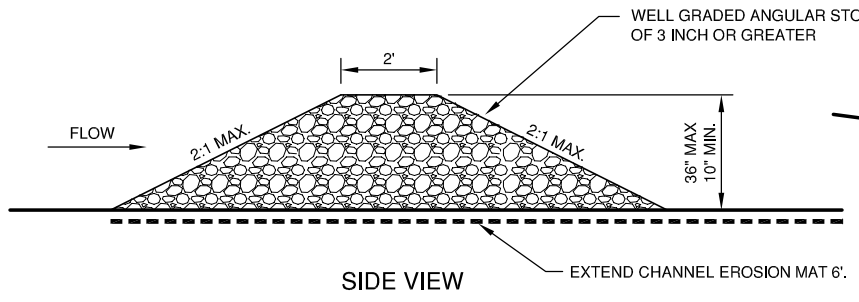
NOTES:

18" X 30" ROCK FILLED FILTER BAG SHALL BE COMPRISED OF THE FOLLOWING:
HDPE HIGH DENSITY POLYETHYLENE
HDPE HIGH DENSITY POLYETHYLENE DRAW STRING KNITTED DIRECTLY INTO BAG OPENING.
80% FABRIC CLOSURE WITH APPARENT OPENING SIZE NO LARGER THAN 1/8 " X 1/8 "
ROLLED SEAM USING A MINIMUM OF 480 DENIER POLYESTER SEWING YARN FOR STRENGTH AND DURABILITY.

USE WELL GRADED COURSE AGGREGATE CONFORMING TO THE FOLLOWING GRADATION REQUIREMENTS

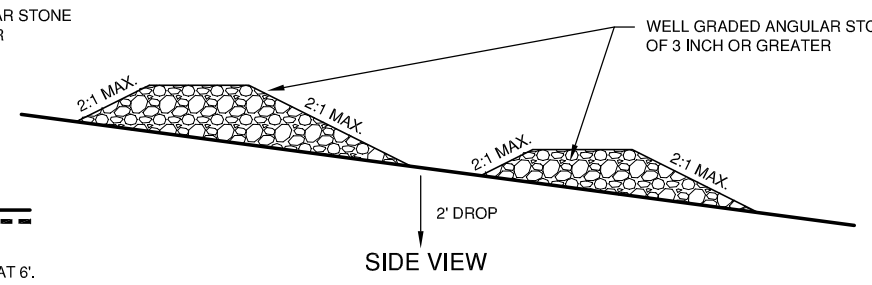


DITCH CHECK DETAIL



SIDE VIEW

ROCK FILLED EROSION CONTROL BAGS TYPE B



SIDE VIEW

TEMPORARY DITCH CHECK USING STONE TYPE C

SA.	Consultant: Robert E. Lee & Associates, Inc.	CITY OF OAK CREEK, WISCONSIN			APPROVED BY UTILITY ENGINEER DATE
ST.		DESIGNED BY DATE	DRAWN BY DATE	CHECKED BY DATE	APPROVED BY CITY ENGINEER DATE
W.		D.A.M. 8/13/09	R.L.B. 8/13/09	K.A.K. 8/13/09	
G.					SCALE / SHEET
E.	ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES	EROSION CONTROL DETAILS			PLAN HOR. N.T.S. / 37
T.		DITCH CHECK			PROFILE HOR. N.T.S. / OF
I.	4664 GOLDEN POND PARK CT. HOBART, WISCONSIN 54155 PHONE: 920-662-9541 FAX: 920-662-9141 WWW.RELEEINC.COM	IN: PUETZ ROAD BOOSTER STATION			VER. N.T.S. / 53
TS.					
PP.					
	REVISION BY DATE	FILE NO: 08101			200-C-02

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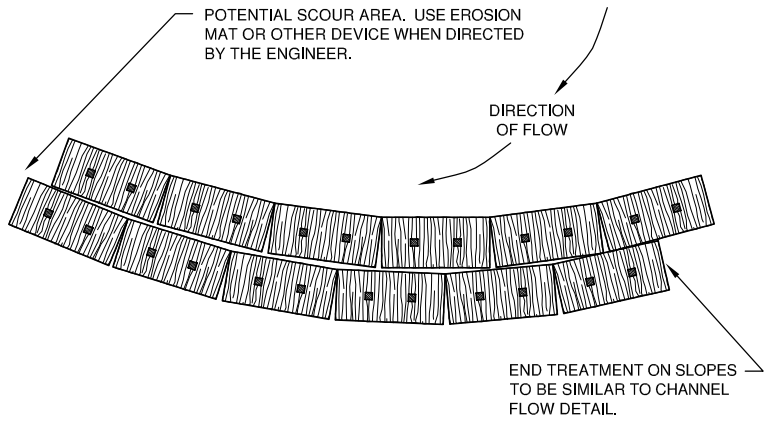
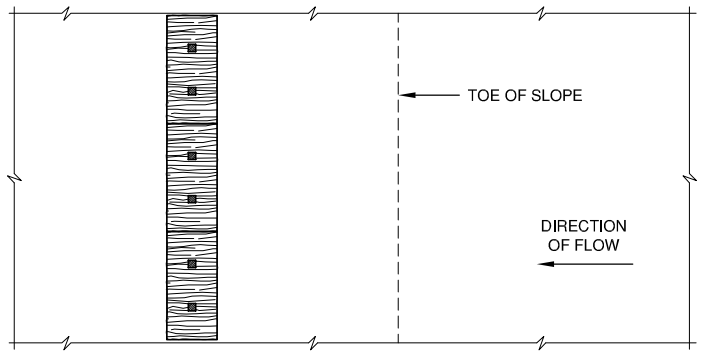
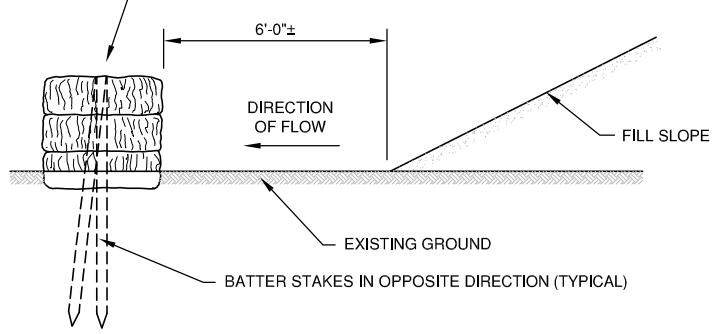


PLAN VIEW
(WHEN ALTERING THE DIRECTION OF FLOW)

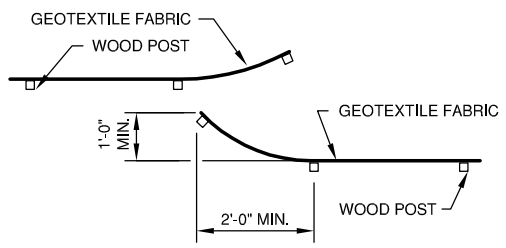


PLAN VIEW



FRONT ELEVATION
WHEN EXISTING GROUND SLOPES AWAY FROM FILL SLOPE

EROSION BALES FOR SHEET FLOW

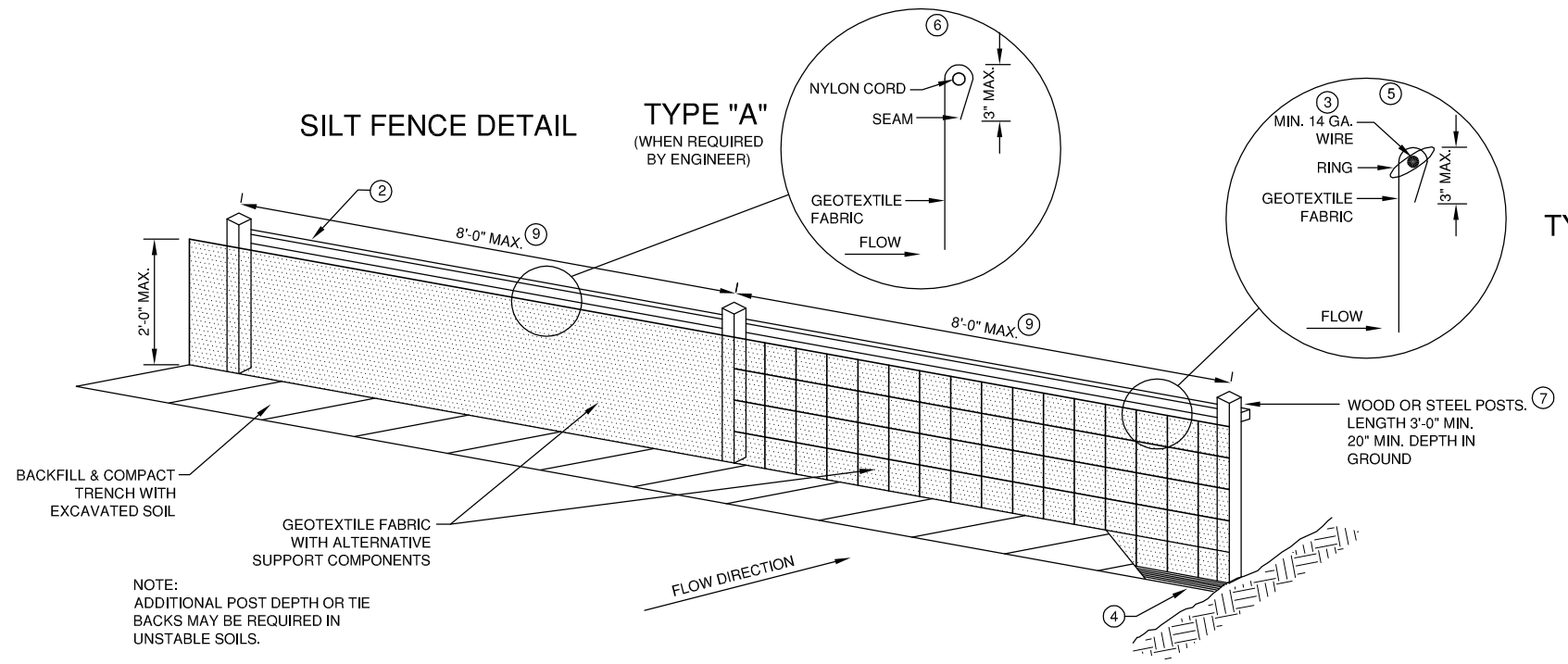


HOOK METHOD (8)

JOINING TWO LENGTHS OF SILT FENCE

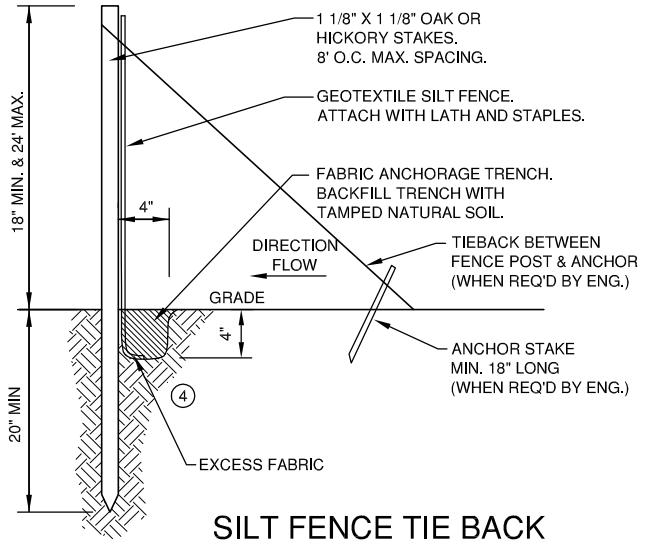
SILT FENCE DETAIL

TYPE "A"
(WHEN REQUIRED BY ENGINEER)

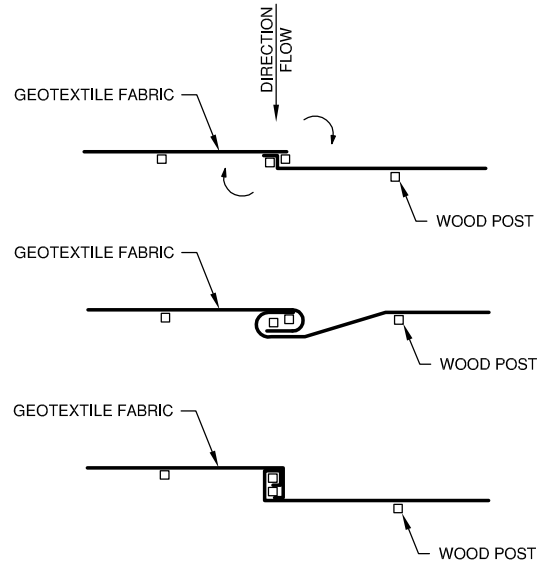


TYPE "B"

NOTE:
ADDITIONAL POST DEPTH OR TIE BACKS MAY BE REQUIRED IN UNSTABLE SOILS.



SILT FENCE TIE BACK



TWIST METHOD (8)

SILT FENCE NOTES:

1. EROSION CONTROL SHALL BE PROVIDED IN ACCORDANCE WITH WDNR TECHNICAL STANDARD.
2. CROSS BRACE WITH 2" X 4" WOODEN FRAME OR EQUIVALENT AT TOP OF POSTS AS DIRECTED BY THE ENGINEER.
3. MINIMUM 14 GAUGE WIRE REQUIRED, FOLD FABRIC 3" OVER THE WIRE AND STAPLE OR PLACE WIRE RINGS ON 12" C.C.
4. EXCAVATE A TRENCH A MINIMUM OF 4" WIDE & 6" DEEP TO BURY AND ANCHOR THE GEOTEXTILE FABRIC. FOLD MATERIAL TO FIT TRENCH AND BACKFILL & COMPACT TRENCH WITH EXCAVATED SOIL.
5. WIRE SUPPORT FENCE SHALL BE 14 GAUGE MINIMUM WOVEN WIRE WITH A MAXIMUM MESH SPACING OF 6". SECURE TOP OF GEOTEXTILE FABRIC TO TOP OF FENCE WITH STAPLES OR WIRE RINGS AT 12" C.C. (TYPE B)
6. GEOTEXTILE FABRIC SHALL BE REINFORCED WITH AN INDUSTRIAL POLYPROPYLENE NETTING WITH A MAXIMUM MESH SPACING OF 3/4" OR EQUAL. A HEAVY DUTY NYLON TOP SUPPORT CORD OR EQUIVALENT IS REQUIRED. (TYPE A)
7. STEEL POSTS SHALL BE STUDDED "TEE" OR "U" TYPE WITH A MINIMUM WEIGHT OF 1.28 LBS./LIN. FT. (WITHOUT ANCHOR) FIN ANCHORS SUFFICIENT TO RESIST POST MOVEMENT ARE REQUIRED. WOOD POSTS SHALL BE A MINIMUM SIZE OF 1 1/8" X 1 1/8" OF OAK OR HICKORY.
8. CONSTRUCT SILT FENCE FROM A CONTINUOUS ROLL, IF POSSIBLE, BY CUTTING LENGTHS TO AVOID JOINTS. IF A JOINT IS NECESSARY, USE ONE OF THE FOLLOWING TWO METHODS: A.) TWIST METHOD -- OVERLAP THE END POSTS AND TWIST, OR ROTATE, AT LEAST 180 DEGREES, B:) HOOK METHOD -- HOOK THE END OF EACH SILT FENCE LENGTH.
9. THE MAXIMUM SPACING OF POSTS FOR WOVEN FABRIC SILT FENCE SHALL BE 8 FEET AND FOR NON-WOVEN FABRIC, 3 FEET.

EROSION CONTROL SHEET FLOW NOTES:

1. ANY SOIL STOCKPILED THAT REMAINS FOR MORE THAN 7 DAYS SHALL BE COVERED OR TREATED WITH STABILIZATION PRACTICES SUCH AS TEMPORARY OR PERMANENT SEEDING AND MULCHING.
2. A MINIMUM OF 4 INCHES OF TOPSOIL MUST BE APPLIED TO ALL AREAS TO BE SEEDED OR SODDED.
3. ALL WASTE AND UNUSED BUILDING MATERIALS (INCLUDING GARBAGE, DEBRIS, CLEANING WASTES, WASTEWATER, TOXIC MATERIALS, OR HAZARDOUS MATERIALS) SHALL BE PROPERLY DISPOSED OF AND NOT ALLOWED TO BE CARRIED OFF-SITE BY RUNOFF OR WIND.
4. ALL OFF-SITE SEDIMENT DEPOSITS OCCURRING AS A RESULT OF CONSTRUCTION WORK OR A STORM EVENT SHALL BE CLEANED UP BY THE END OF EACH DAY. **FLUSHING SHALL NOT BE ALLOWED.**
5. ANY SOIL EROSION THAT OCCURS AFTER FINAL GRADING AND/OR THE APPLICATION OF STABILIZATION MEASURES MUST BE REPAIRED AND THE STABILIZATION WORK REDONE.
6. FOR ANY DISTURBED AREA THAT REMAINS INACTIVE FOR GREATER THAN 7 WORKING DAYS, OR WHERE GRADING WORK EXTENDS BEYOND THE PERMANENT SEEDING DEADLINES, THE SITE MUST BE TREATED WITH TEMPORARY STABILIZATION MEASURES SUCH AS SOIL TREATMENT, TEMPORARY SEEDING AND/OR MULCHING.
7. ALL TEMPORARY EROSION CONTROL PRACTICES SHALL BE MAINTAINED UNTIL THE SITE IS STABILIZED WITH 70% VEGETATION AND A NOTICE OF TERMINATION HAS BEEN APPROVED BY THE DNR.
8. WIND EROSION SHALL BE KEPT TO A MINIMUM DURING CONSTRUCTION. WATERING, MULCH OR A TACKING AGENT MAY NEED TO BE UTILIZED TO PROTECT NEARBY RESIDENCES/WATER RESOURCES.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL THE EROSION CONTROL MEASURES IN CONFORMANCE WITH THE WDNR CONSERVATION PRACTICE STANDARDS, LATEST EDITION.
10. UPON COMPLETION OF STORM INLET CONSTRUCTION, THE CONTRACTOR SHALL INSTALL STORM DRAIN INLET PROTECTION FOR CONSTRUCTION SITE AS SPECIFIED.
11. FINE SEDIMENT ACCUMULATIONS SHALL BE CLEANED FROM STREETS, PRIVATE DRIVES, OR PARKING AREAS BY MANUAL OR MECHANICAL SWEEPING A MINIMUM OF ONCE PER WEEK AND BEFORE ALL IMMINENT RAINS.
12. EROSION AND SEDIMENT CONTROL STRUCTURES SHALL BE INSPECTED WEEKLY AND WITHIN 24 HOURS OF RAINFALL OF 0.5 INCH OR MORE.

SA.
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E.
T.
I.
TS.
PP.

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REVISION BY DATE

CITY OF OAK CREEK, WISCONSIN

DESIGNED BY DATE	DRAWN BY DATE	CHECKED BY DATE
D.A.M. 8/13/09	R.L.B. 8/13/09	K.A.K. 8/13/09

EROSION CONTROL DETAILS
SHEET FLOW
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	38
PROFILE HOR. N.T.S. VER. N.T.S.	OF 53

200-C-03

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PLAN VIEW: PLAN

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GENERAL

G1 SCOPE

THE NOTES AND DETAILS ON THIS SHEET ARE GENERAL AND APPLY TO THE ENTIRE PROJECT EXCEPT WHERE THERE ARE SPECIFIC INDICATIONS TO THE CONTRARY.

G2 APPLICABLE SPECIFICATIONS AND CODES

CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE WISCONSIN ADMINISTRATIVE CODE. THE ABOVE SHALL GOVERN EXCEPT WHERE OTHER APPLICABLE CODES OR THE FOLLOWING NOTES ARE MORE RESTRICTIVE.

G3 ALTERNATIVE DESIGNS

THE STRUCTURAL SYSTEMS AND DETAILS ON THESE PLANS ARE THE PRIORITY DESIGN. ALTERNATIVE SYSTEMS AND DETAILS MAY BE USED IF THE CONTRACTOR SUBMITS PLANS WITH SUBSTANTIATING CALCULATIONS AND TEST DATA, AND IF THE ALTERNATIVE PLANS ARE ACCEPTED BY THE ENGINEER.

G4 DIMENSIONS

STRUCTURAL DIMENSIONS CONTROLLED BY OR RELATED TO MECHANICAL OR ELECTRICAL EQUIPMENT SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

G5 PROVISIONS FOR EQUIPMENT

MECHANICAL AND ELECTRICAL EQUIPMENT SUPPORTS, ANCHORAGES, OPENINGS, RECESSES AND REVEALS NOT SHOWN ON THE STRUCTURAL DRAWINGS BUT REQUIRED BY OTHER CONTRACT DRAWINGS SHALL BE PROVIDED PRIOR TO CASTING CONCRETE.

G6 CONSTRUCTION LOADS

STRUCTURES HAVE BEEN DESIGNED FOR OPERATIONAL LOADS ON COMPLETED STRUCTURES; DURING CONSTRUCTION, STRUCTURES SHALL BE PROTECTED BY BRACING AND BALANCING WHEREVER EXCESSIVE CONSTRUCTION LOADS MAY OCCUR. ALL TEMPORARY AND PERMANENT SURCHARGE LOADS SHALL BE CONSIDERED.

G7 DRAINAGE SURFACES

SLOPE DRAINAGE SURFACES UNIFORMLY TO DRAIN. SLOPE SHALL BE 1/4-IN. PER FOOT EXCEPT WHERE NOTED OTHERWISE ON THE PLANS.

G8 FLOOR DRAINS

SEE ARCHITECTURAL AND MECHANICAL DRAWINGS FOR LOCATIONS AND SIZES.

STRUCTURAL

S1 DESIGN CODE

DESIGN IS IN ACCORDANCE WITH THE LATEST EDITION OF THE WISCONSIN ADMINISTRATIVE CODE EXCEPT WHERE OTHER APPLICABLE CODES OR THE FOLLOWING NOTES ARE MORE RESTRICTIVE.

S2 DESIGN LIVE LOADS

WALKWAYS AND STAIRS -- 100 PSF

GROUND SNOW LOAD -- 40 PSF

WIND -- 20 PSF

S3 CONSTRUCTION JOINTS

LOCATION OF ALL CONSTRUCTION JOINTS SHALL HAVE THE APPROVAL OF THE ENGINEER. MAXIMUM LENGTH OF WALL AND SLAB POURS 40'. MAXIMUM HEIGHT OF WALL POURS 16' UNLESS OTHERWISE APPROVED BY ENGINEER. IN WATERTIGHT STRUCTURES, CONTINUOUS WATERSTOPS SHALL BE PROVIDED IN THE CONSTRUCTION JOINTS. CONSTRUCTION JOINTS SHALL BE AS DETAILED ON THE DRAWINGS.

ALUMINUM

A1 APPLICABLE CODE

DESIGN AND CONSTRUCTION OF ALUMINUM STRUCTURES SHALL CONFORM TO SUGGESTED SPECIFICATIONS FOR STRUCTURES OF ALUMINUM ALLOYS 6061-T6 AND 6062-T6, AMERICAN SOCIETY OF CIVIL ENGINEERS PROCEEDINGS PAPER NO. 3341, DECEMBER 1962.

A2 MATERIAL

UNLESS OTHERWISE INDICATED, STRUCTURAL ALUMINUM SHALL BE ALLOY 6061-T6 AS SPECIFIED IN ASTM B-308.

A3 ALUMINUM IN CONTACT WITH CONCRETE

WHERE ALUMINUM IS IN CONTACT WITH CONCRETE OR MASONRY SURFACES OR DISSIMILAR METALS, CONTACT SURFACES SHALL BE COATED WITH HEAVY ALKALI-RESISTANT BITUMINOUS PAINT.

STEEL

ST1 APPLICABLE CODE

STEEL CONSTRUCTION SHALL CONFORM TO SPECIFICATIONS AND STANDARDS PRESENTED IN THE LATEST EDITION OF AISC STEEL CONSTRUCTION MANUAL.

ST2 MATERIAL

ALL STRUCTURAL SHAPES, BARS, PLATES AND SHEETS INDICATED ON THE DRAWINGS SHALL CONFORM TO ASTM A-36. ALL PIPE SHALL CONFORM TO ASTM A-53, TYPE E, GRADE B. ALL RECTANGULAR OR SQUARE TUBES SHALL CONFORM TO ASTM A-500, GRADE B.

ST3 WELDING

WELDING SHALL CONFORM TO AWS CODE FOR ARC AND GAS WELDING IN BUILDING CONSTRUCTION. ALL WELDERS MUST BE CERTIFIED, USE E-70XX ELECTRODES. ALL FILLET WELDS SHALL BE FULL LENGTH AND HAVE END RETURNS IN THE SAME PLANE UNLESS NOTED OTHERWISE. ALL BUTT AND GROOVE WELDS SHALL BE FULL PENETRATION UNLESS OTHERWISE NOTED. PROVIDE CONTINUOUS SEAL WELDS AT ALL UNWELDED JOINTS.

ST4 ENCASED STEEL

STEEL ENCASED IN CONCRETE SHALL NOT BE PAINTED ON THAT SURFACE IN CONTACT WITH THE CONCRETE AND SHALL HAVE A CLEAN SURFACE FOR BONDING TO CONCRETE. GALVANIZED STEEL ENCLOSED IN CONCRETE SHALL HAVE SURFACES IN CONTACT WITH THE CONCRETE PHOSPHATIZED AND CLEANED.

ST5 COATINGS

AS SPECIFIED IN SECTION 09800 MISCELLANEOUS METALS SHALL BE GALVANIZED AS SPECIFIED IN SECTION 05500.

CONCRETE

C1 APPLICABLE CODE

CONCRETE CONSTRUCTION SHALL CONFORM TO ACI 318-89 AND ACI 350R-89.

C2 REINFORCING STEEL DETAILS

ALL DETAILING, FABRICATION, AND ERECTION OF REINFORCING BARS, UNLESS OTHERWISE NOTED, SHALL BE IN ACCORDANCE WITH MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES (ACI-315), LATEST EDITION.

C3 MATERIAL STRENGTHS

CONCRETE, FC' 4,000 PSI ULTIMATE COMPRESSIVE STRESS AT 28 DAYS. ALL CONCRETE TO BE AIR ENTRAINED PER SPECIFICATIONS.

REINFORCING STEEL SHALL BE DEFORMED AND HAVE A TENSILE YIELD STRENGTH 60,000 PSI (GRADE 60).

C4 CONCRETE COVER

CONCRETE COVER FOR REINFORCING BARS SHALL BE AS FOLLOWS WITH A MINIMUM COVER OF ONE BAR DIAMETER.

FOOTINGS AND FOUNDATION MATS CAST AGAINST EARTH -- 3".

FORMED CONCRETE TO BE IN CONTACT WITH GROUND OR WEATHER:

AT BARS GREATER THAN #5 -- 2"
AT BARS #5 OR LESS -- 1-1/2"

C5 MINIMUM REINFORCEMENT

CONCRETE CONSTRUCTION SHALL BE REINFORCED CONCRETE EXCEPT WHERE PLAIN CONCRETE (P/C) IS CALLED OUT ON THE DRAWINGS, IN WHICH CASE NO REINFORCEMENT SHALL BE USED. CONCRETE THAT IS NOT DESIGNATED P/C AND HAS NO REINFORCEMENT INDICATED SHALL BE REINFORCED PER ACI 318-89 AND THE FOLLOWING SCHEDULES:

WALL THICKNESS	SIZE	SPACING, E.W.	POSITION
6"	#4	12"	ON CENTERLINE
8"	#4	12"	E.F.
12" AND GREATER	#5	12"	E.F.

MASS CONCRETE SHALL BE REINFORCED WITH #5 @ 12" E.W. MINIMUM IN ALL FACES.

C6 SHRINKAGE AND TEMPERATURE STEEL

UNLESS OTHERWISE NOTED, SHRINKAGE AND TEMPERATURE REINFORCING STEEL SHALL BE PROVIDED FOR SLABS IN ACCORDANCE WITH THE FOLLOWING SCHEDULES:

SLAB THICKNESS	SIZE	SPACING
4"	#3	12"
5"	#3	12"
6"-7"	#3	12" T & B
8"-12"	#4	12" T & B
GREATER THAN 12"	#5	12" T & B

C7 EXTRA ACCESSORY BARS

IN ADDITION TO NORMAL ACCESSORIES USED TO HOLD REINFORCING STEEL FIRMLY IN POSITION, EXTRA ACCESSORY BARS SHALL BE USED AS FOLLOWS:

IN SLABS #5 RAISER BARS AT 36" O/C MAXIMUM TO SUPPORT TOP REINFORCING STEEL.

IN WALLS WITH TWO CURTAINS #3 "U" OR "Z" SHAPE SPACERS AT 6' O/C E.W.

C8 BAR SPLICES

PROVIDE CLASS "B" LAP SPLICES UNLESS OTHERWISE NOTED. PROVIDE 1.3 X CLASS "B" LAP SPLICES FOR HORIZONTAL BARS WITH MORE THAN 12" OF FRESH CONCRETE CAST BELOW THE REINFORCEMENT. PROVIDE TEMPERATURE REINFORCEMENT WITH A 30 BAR DIAMETER LAP, BUT NOT LESS THAN 12".

PROVIDE THE FOLLOWING LAP LENGTHS (INCHES) FOR SPLICES IN REINFORCING STEEL:

BAR SIZE	CLASS "A"	CLASS "B"
#3	12	14
#4	14	19
#5	18	23
#6	21	28
#7	25	32
#8	30	39
#9	38	49
#10	48	63
#11	59	77

C9 RESTRICTED BAR ANCHORAGE

IN CASES WHERE REINFORCING BARS CANNOT BE EXTENDED AS FAR AS REQUIRED DUE TO THE LIMITED EXTENT OF THE ADJACENT CONCRETE STRUCTURE, THE BARS SHALL EXTEND AS FAR AS POSSIBLE AND END IN STANDARD HOOKS.

C10 STANDARD HOOKS

BARS WITH HOOKS SHALL CONFORM TO THE REQUIREMENTS OF ACI 318-89.

WHERE HOOKS ARE REQUIRED AT EACH END OF REINFORCING STEEL, DETAIL BARS IN AT LEAST 2 PIECES WITH A LAP SPLICE AT THE CENTER EXCEPT WHERE BARS ARE NOT OF SUFFICIENT LENGTH TO ACCOMMODATE THE SPLICE.

C11 GROUND SUPPORTED SLABS

CONCRETE SLABS SUPPORTED BY GROUND, UNLESS OTHERWISE NOTED, SHALL BE 6" THICK, REINFORCED WITH #4 @ 12" O/C. PROVIDE SPECIFIED VAPOR BARRIER. PROVIDE 1/2" THICK PERFORMED JOINT FILLER TO ISOLATE THE SLAB FROM CONTACT WITH THE STRUCTURE ALONG ITS PERIMETER.

C12 SLOPING SLABS

MONOLITHIC SLABS WITH TOPS THAT ARE SLOPED, SHALL HAVE BOTTOMS SLOPED THE SAME AMOUNT, MAINTAINING A UNIFORM SLAB THICKNESS.

C13 CHAMFERS

EXCEPT AS OTHERWISE REQUIRED, EXPOSED CONCRETE CORNERS AND EDGES SHALL HAVE 3/4" CHAMFERS. RE-ENTRANT CORNERS SHALL NOT HAVE FILLETS.

C14 ANCHORS

USE OF ANCHOR BOLTS OR EXPANSION BOLTS IN MASONRY SHALL CONFORM TO AISI TYPE 316 STAINLESS STEEL AND BE GOVERNED BY THE FOLLOWING TABLE:

BOLT DIAMETER	1/2"	5/8"	3/4"	7/8"	1"	1 1/8"	1 1/4"
MIN. EMBEDMENT IN SOLIDLY GROUTED MASONRY	4"	4"	5"	6"	7"	8"	9"
ALLOWABLE SHEAR	550#	750#	1100#	1500#	1850#	2250#	2500#

ALL ANCHOR BOLTS IN CONCRETE SHALL CONFORM TO AISI TYPE 316 STAINLESS STEEL AND HAVE A STRAIGHT EMBEDMENT OF 12 ROD DIAMETERS AND A 90° HOOK LENGTH OF 3 ROD DIAMETERS UNLESS OTHERWISE NOTED. EMBEDDED PORTION OF ALL ANCHOR BOLTS SHALL BE CLEAN AND FREE OF OIL, GREASE, AND ANY FOREIGN SUBSTANCES.

ALL EXPANSION BOLTS FASTENED TO SOLID CONCRETE OR SOLID MASONRY SHALL BE AISI TYPE 316 STAINLESS STEEL WEDGE TYPE IN ACCORDANCE WITH FEDERAL SPECIFICATION EE-S-325, GROUP 11, TYPE 5, CLASS 1. ALLOWABLE LOADS SHALL NOT EXCEED THE MANUFACTURER'S RECOMMENDATIONS.

ALL EXPANSION BOLTS FASTENED TO HOLLOW MASONRY OR HOLLOW CONCRETE SHALL BE AISI TYPE 316 STAINLESS STEEL SLEEVE TYPE IN ACCORDANCE WITH FEDERAL SPECIFICATION FF-S-325, GROUP II, TYPE 3, CLASS 3. ALLOWABLE LOADS SHALL NOT EXCEED THE MANUFACTURER'S RECOMMENDATIONS.

ALL ADHESIVE ANCHORS SHALL BE AS SPECIFIED IN SECTION 05500.

MASONRY

M1 MORTAR

USE MORTARS SPECIFIED IN SECTION 04100.

LAYOUT: LAYOUT
PLAN VIEW: PLAN

SA.
ST.
W.
G.
E.
T.
I.
TS.
PP.

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REVISION BY DATE

CITY OF OAK CREEK, WISCONSIN

DESIGNED BY DATE	DRAWN BY DATE	CHECKED BY DATE
D.A.M. 8/13/09	R.L.B. 8/13/09	K.A.K. 8/13/09

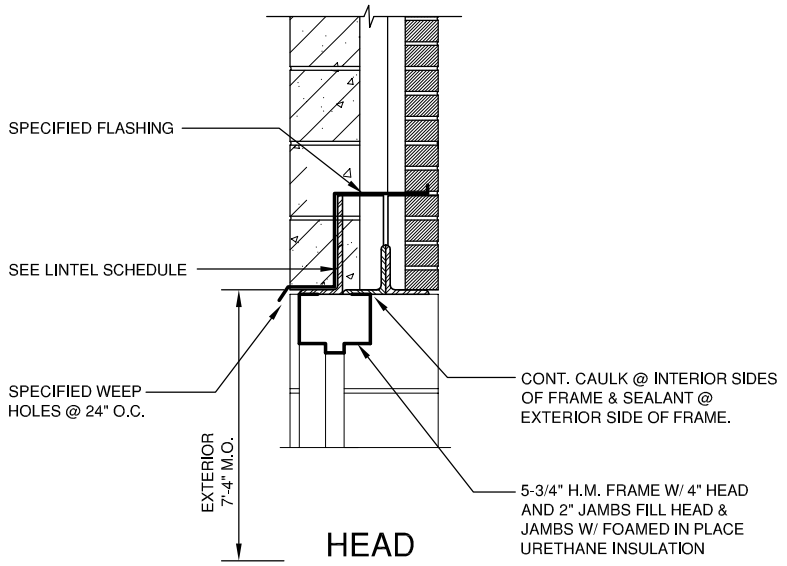
STRUCTURAL NOTES
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	39
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

200-AS-01



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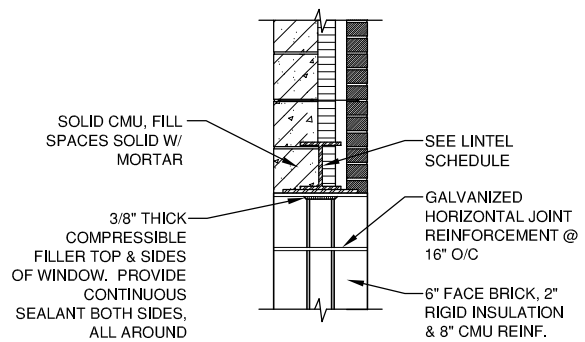

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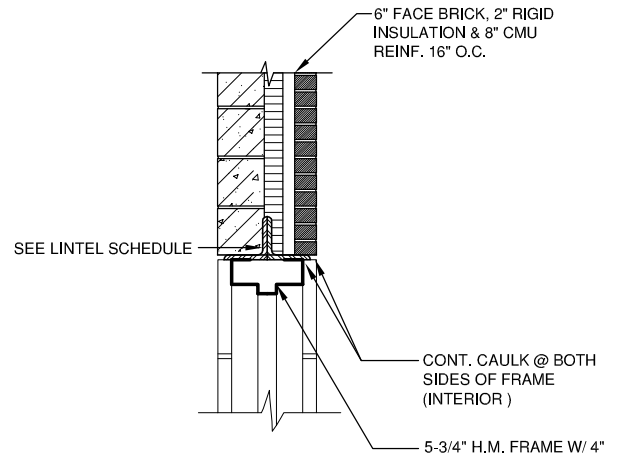

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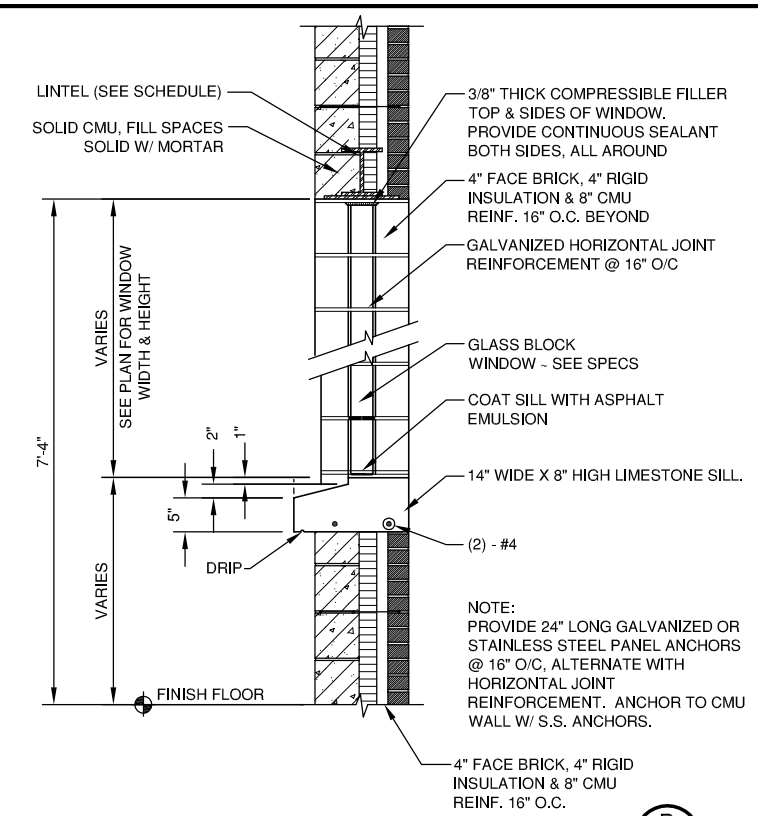


GLASS BLOCK WINDOW & LIMESTONE SILL
D VAR.

LINTEL SCHEDULE

MARK	DESCRIPTION	SKETCH	REMARKS
L1	8 X 8 BOND BEAM W/ 3-1/2" x 3-1/2" x 5/16" OR WALL WIDTH x 8" DEEP BOND BEAM W/ #5 BOTTOM	⌐ ⌐	8" BEARING EACH END
L2	3∠3-1/2" x 3-1/2" x 5/16" OR W8x10 W/ PL 5/16"x11" WELDED TO BOTTOM	⊥	8" BEARING EACH END
L3	W8x10 W/ PL 5/16" x 11" WELDED TO BOTTOM	⊥	8" BEARING EACH END

ROOM FINISH SCHEDULE

	FLOOR				BASE			WALL				CEILING				
NAME	CONCRETE	RESILIENT	EPOXY PT.	CERAMIC	VINYL	CERAMIC	NONE	CMU	CONCRETE	DRYWALL	OTHER	CONCRETE	DRYWALL	ACOUSTICAL	OTHER	NOTES
101 PUMP ROOM	S						X	P							P	CEILING T & G
102 CHEMICAL ROOM	S						X	P					P		P	
103 GENERATOR ROOM	S						X	P							P	CEILING T & G
104 MCC ROOM	S						X	P							P	
105 RESTROOM	S						X	P					P		P	

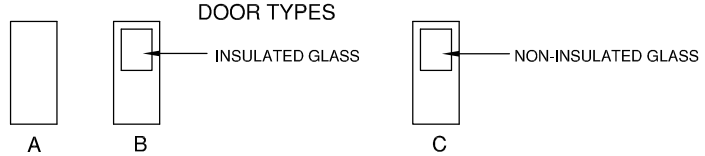
S= SEAL CONCRETE. REFER TO SPEC. SECTION 09800
P= PAINT. REFER TO SPEC SECTION 09800.
X = NO PAINT, PROVIDE AS INDICATED

NOTE:
1. CHLORINE ROOM SHALL BE SEALED GAS TIGHT FROM OTHER ROOMS.

DOOR SCHEDULE

	DOOR						FRAME	HRDW. SET	REMARKS
	SIZE								
NO.	W	H	T	MAT.	TYPE	GLASS	MAT.		
101	2- 3'-0	7'-0	1 3/4	HM	A		HM	2	INSULATE DOOR, FRAME AND PAIR
102	3'-0	7'-0	1 3/4	F.R.P.	A		HM	4	INSULATE DOOR AND FRAME
103	2- 3'-0	7'-0	1 3/4	HM	A		HM	2	INSULATE DOOR, FRAME AND PAIR
104	3'-0	7'-0	1 3/4	HM	A		HM	1	
105	3'-0	7'-0	1 3/4	HM	A		HM	1	
106	3'-0	7'-0	1 3/4	HM	A		HM	5	

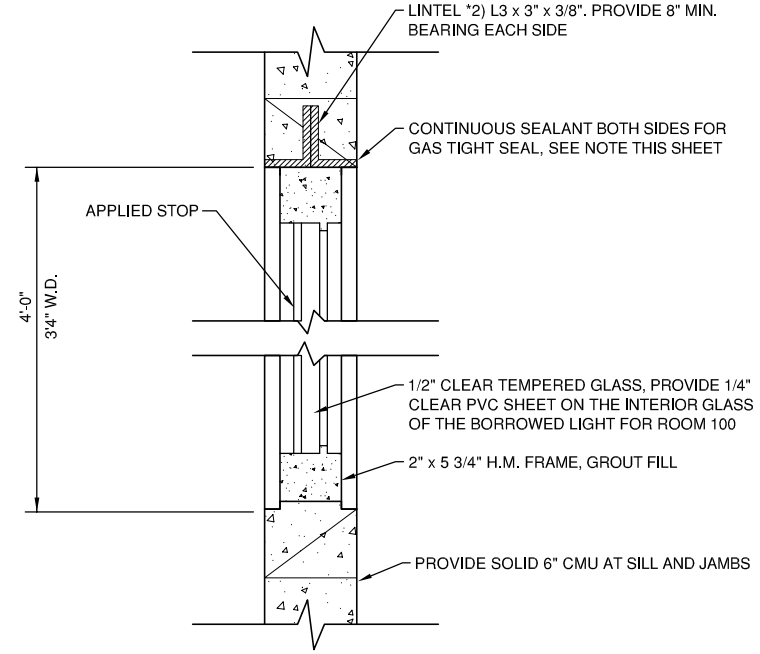
DOOR TYPES



F.R.P. = FIBERGLASS REINFORCED PLASTIC

H.M. = HOLLOW METAL

I.M. = INSULATED METAL DOOR AND FRAME



BORROWED LIGHT DETAIL
E VAR.

NOTE:
PROVIDE JAMB ANCHORS, 2 PER JAMB

SA. ST. W. G. E. T. I. TS. PP.

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CITY OF OAK CREEK, WISCONSIN

DESIGNED BY	DATE	DRAWN BY	DATE	CHECKED BY	DATE
D.A.M.	8/13/09	R.L.B.	8/13/09	K.A.K.	8/13/09

DOOR AND WINDOW SCHEDULES AND DETAILS
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	40
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

200-AS-02

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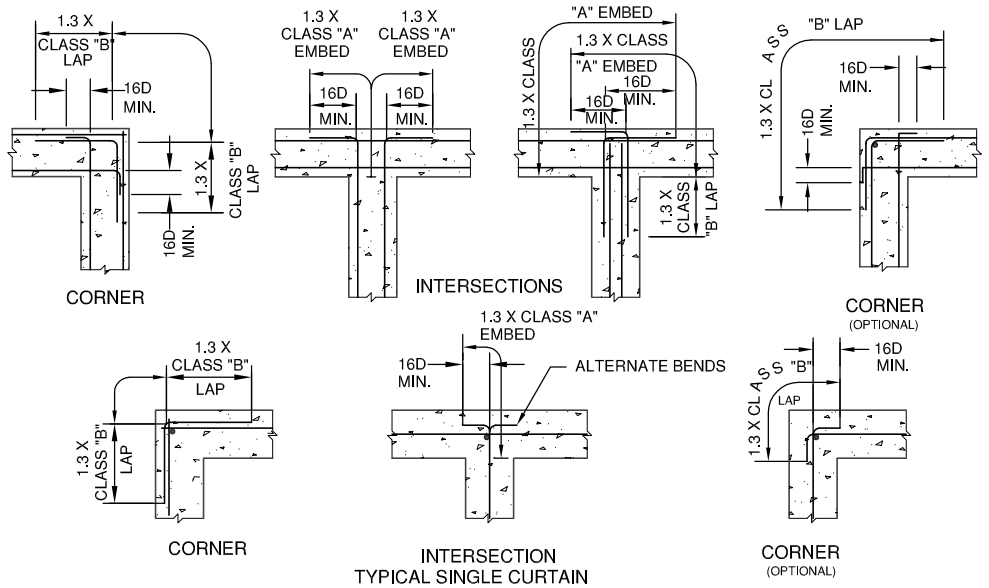
PLAN VIEW: PLAN

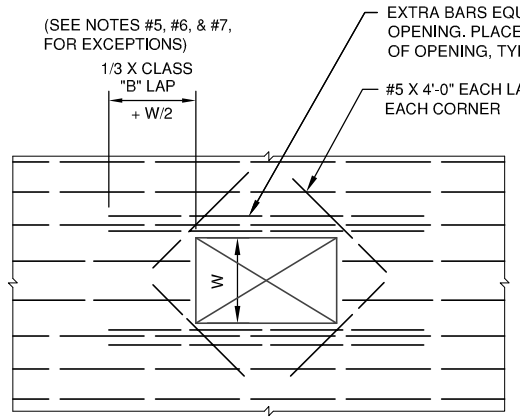


MINIMUM REINFORCING STEEL
AT WALL INTERSECTIONS

DETAIL A VAR.

1.) D = BAR DIAMETER

2.) ALL 90° BENDS & EMBEDMENT LENGTHS SHALL BE AS SHOWN AND AS PER ACI 315 UNLESS OTHERWISE INDICATED ON DESIGN DRAWINGS.



REINFORCEMENT AT SLAB & WALL
OPENINGS

DETAIL B VAR.

1.) REINFORCEMENT IN OTHER DIRECTION NOT SHOWN, BUT SHALL BE TREATED IN THE SAME MANNER.

2.) W = DIMENSION OF OPENING PERPENDICULAR TO BARS CUT. FOR CIRCULAR OPENINGS, W = DIA.

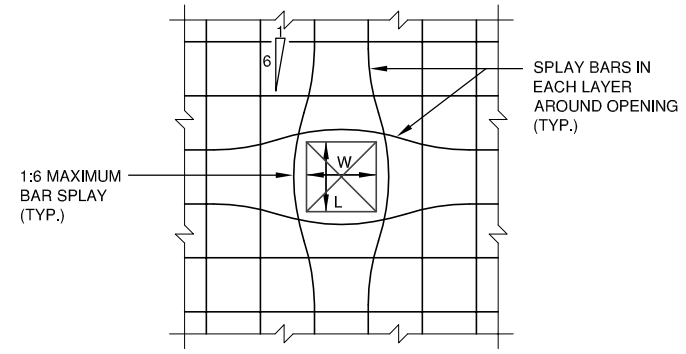
3.) ALL OPENINGS IN WALLS OR SLABS LARGER THAN 12" OR LARGER IN ANY ONE DIRECTION SHALL CONFORM TO THIS DETAIL.

4.) SEE MECH. AND ARCH. DRAWINGS FOR SLAB AND WALL OPENINGS NOT SHOWN ON STRUCTURAL DRAWINGS.

5.) ADDITIONAL BOTTOM BARS IN SLABS SHALL EXTEND FROM CENTER OF SUPPORTS ON EA. SIDE OF OPENING.

6.) ADDITIONAL VERTICAL BARS IN WALLS SHALL EXTEND FULL HEIGHT OF WALL. PROVIDE ADDITIONAL DOWELS TO FOOTING.

7.) PROVIDE STD. 180 HOOK ON END OF ADDITIONAL TOP BARS IN SLABS THAT CANNOT EXTEND TO LENGTH SHOWN.

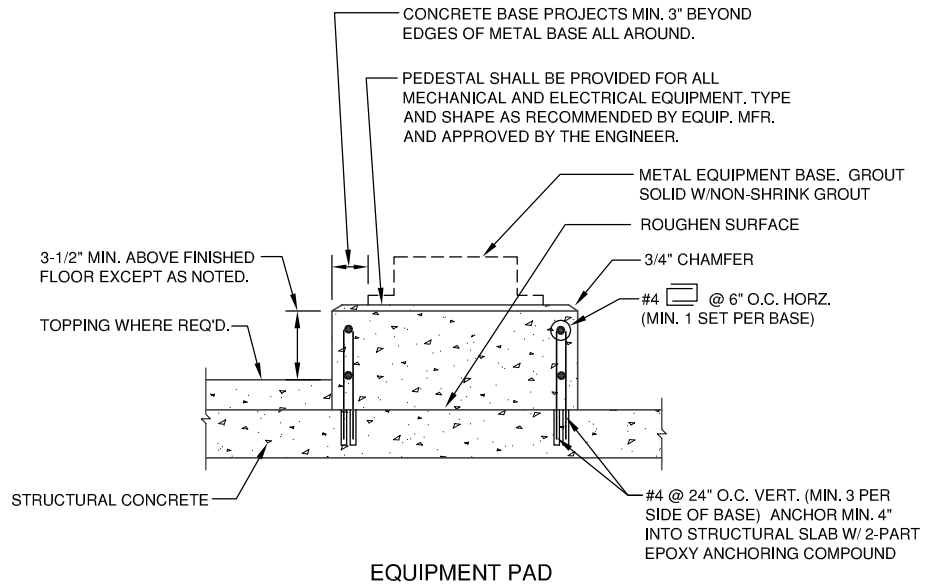


OPENINGS IN STRUCTURAL
SLABS & WALLS

DETAIL C VAR.

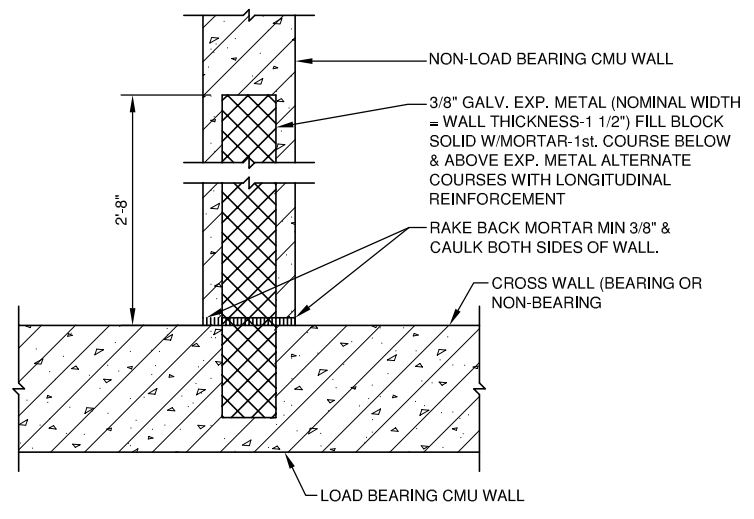
NOTE:

THE DETAIL APPLIES TO RECTANGULAR OR CIRCULAR OPENINGS WHICH HAVE DIMENSIONS LESS THAN 12". SEE DETAIL B, THIS SHEET, FOR OPENINGS 12" OR LARGER.



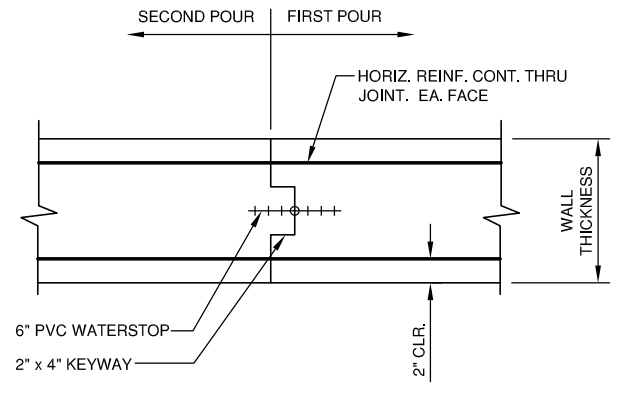
EQUIPMENT PAD

DETAIL D VAR.



INTERSECTING MASONRY WALLS
NON-LOAD BEARING WITH LOAD BEARING

DETAIL E VAR.



VERTICAL CONSTRUCTION JOINTS IN WALLS
TYPICAL CONSTRUCTION JOINT

DETAIL F VAR.

SA.	Consultant: Robert E. Lee & Associates, Inc.	CITY OF OAK CREEK, WISCONSIN		APPROVED BY
ST.				UTILITY ENGINEER DATE
W.		DESIGNED BY DATE	DRAWN BY DATE	CHECKED BY DATE
G.		D.A.M. 8/13/09	R.L.B. 8/13/09	K.A.K. 8/13/09
E.	ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES			APPROVED BY
T.				CITY ENGINEER DATE
I.		TYPICAL REINFORCING AND CONCRETE DETAILS		SCALE / SHEET
TS.	4664 GOLDEN POND PARK CT. HOBART, WISCONSIN 54155 PHONE: 920-662-9641 FAX: 920-662-9141 WWW.RELEEINC.COM	IN: PUETZ ROAD BOOSTER STATION		PLAN HOR. N.T.S. / 41
PP.				PROFILE HOR. N.T.S. / OF
				VER. N.T.S. / 53
	REVISION BY DATE	FILE NO: 08101		200-AS-03

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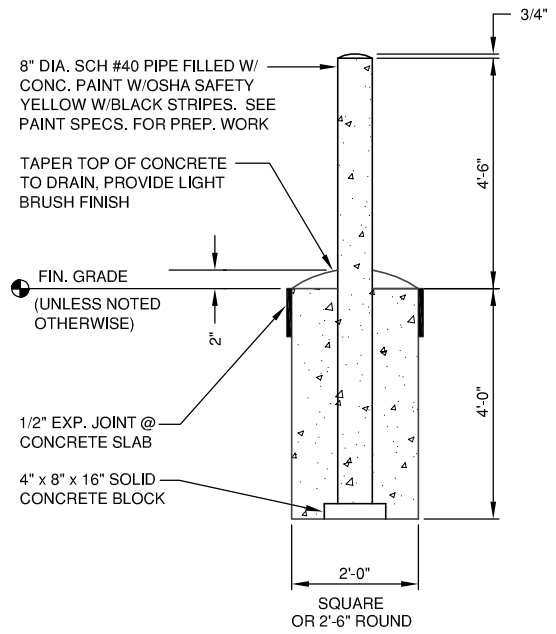
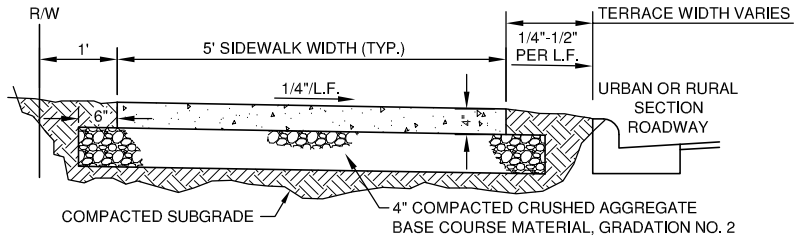
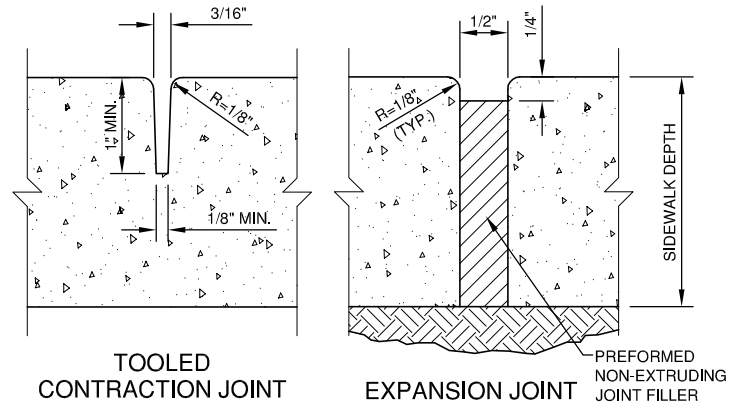


TYPICAL GUARD POST



TYPICAL SECTION

NOTE:
REFER TO SPECIFICATIONS FOR REINFORCEMENTS.

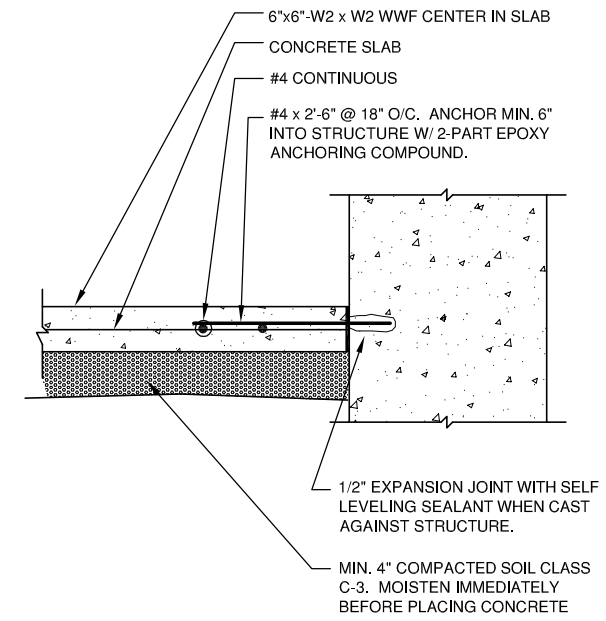


TOOLED CONTRACTION JOINT

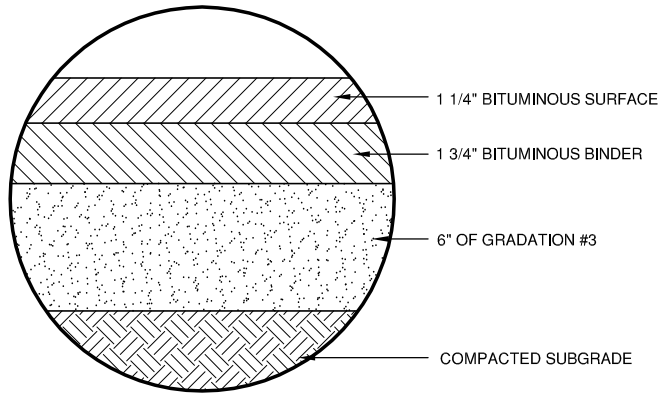
EXPANSION JOINT

WALK WIDTH	CONTRACTION JOINT SPACING		EXPANSION JOINT SPACING
	TRANSVERSE	LONGITUDINAL	
4'	4'	NOT REQ'D	100' MAX.
5'	5'	NOT REQ'D.	100' MAX.
6'	6'	NOT REQ'D.	100' MAX.
8'	4'	4'	100' MAX.
10'	5'	5'	100' MAX.
12'	6'	6'	100' MAX.

SIDEWALK DETAIL

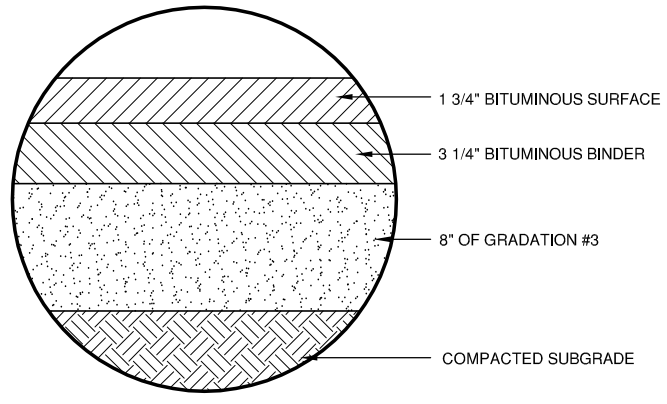


TYPICAL SIDEWALK ADJACENT TO STRUCTURE

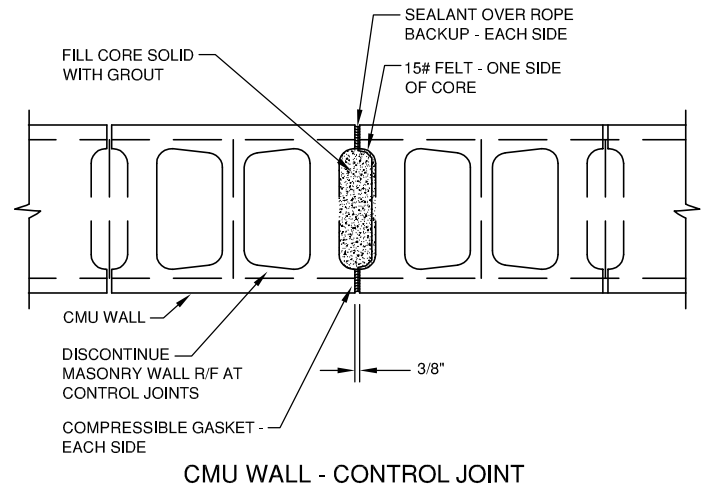


*SEE SPEC SECTION 02235 FOR GRADATIONS.

PATHWAY PAVEMENT DETAIL



PUMP HOUSE PAVEMENT AND PARKING DETAIL



CMU WALL - CONTROL JOINT

SA.	Consultant: Robert E. Lee & Associates, Inc.	CITY OF OAK CREEK, WISCONSIN		APPROVED BY UTILITY ENGINEER DATE
ST.		DESIGNED BY DATE	DRAWN BY DATE	CHECKED BY DATE
W.		D.A.M. 8/13/09	R.L.B. 8/13/09	K.A.K. 8/13/09
G.				APPROVED BY CITY ENGINEER DATE
E.	ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES	ARCHITECTURAL DETAILS		SCALE / SHEET
T.		IN: PUETZ ROAD BOOSTER STATION		PLAN HOR. N.T.S. 42
I.	4664 GOLDEN POND PARK CT. HOBART, WISCONSIN 54155 PHONE: 920-662-9641 FAX: 920-662-9141 WWW.RELEEINC.COM			PROFILE HOR. N.T.S. OF
TS.				VER. N.T.S. 53
PP.	REVISION BY DATE	FILE NO: 08101		200-AS-04

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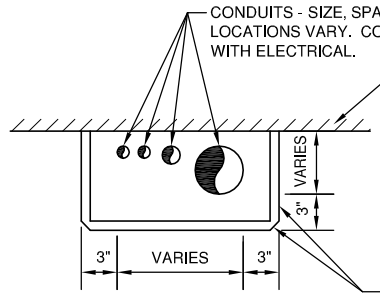

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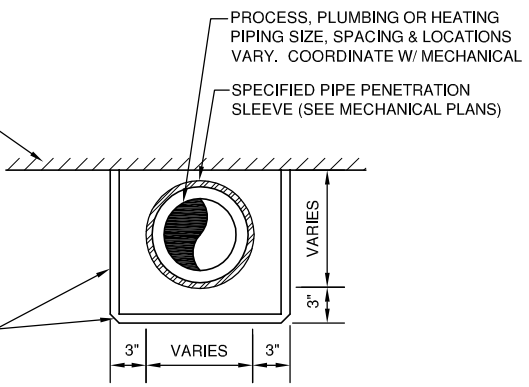

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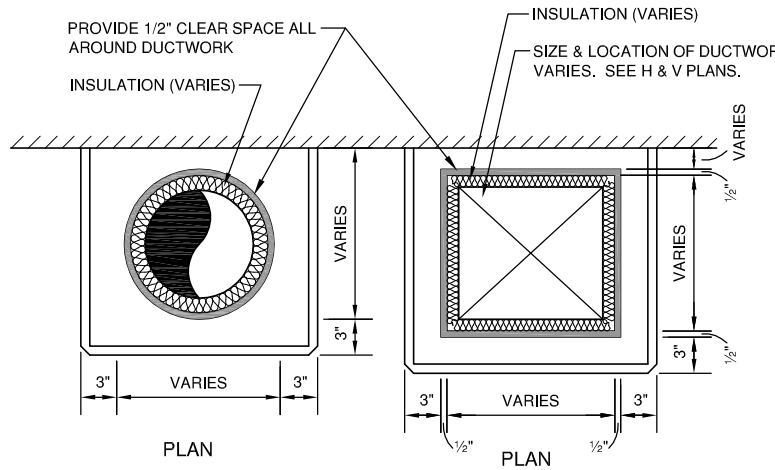
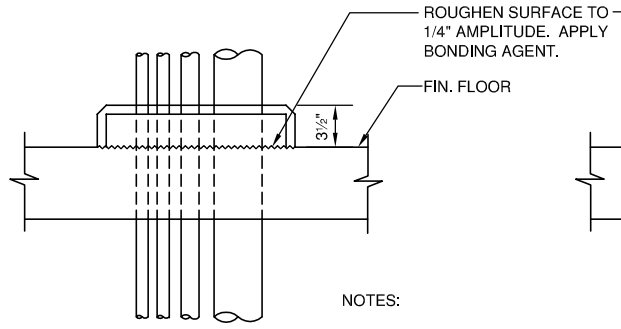


PLAN

PLAN

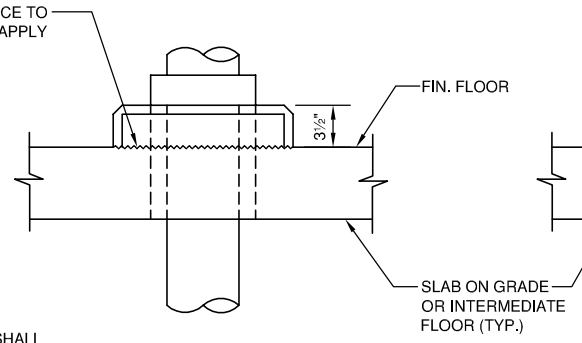


CONDUITS

NOTES:

1) CONCRETE FOR CURBS SHALL BE CLASS A-3.

2) CONDUITS, PIPING OR DUCTS THAT ARE NOT ADJACENT TO WALLS SHALL HAVE 3" WIDE CONCRETE CURB ALL AROUND.

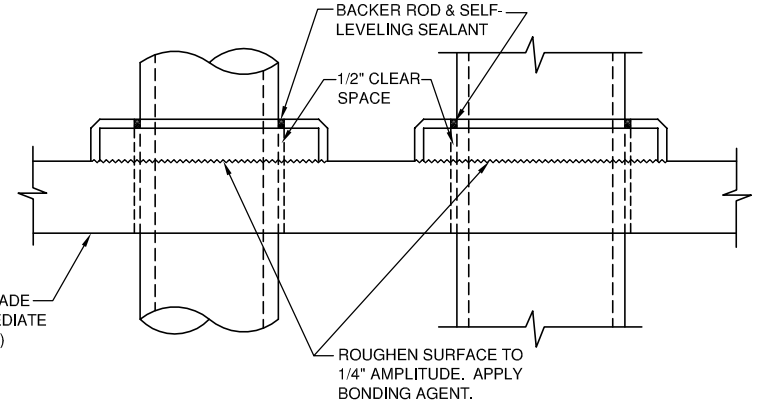


ELEVATION

PROCESS PLUMBING OR HEATING PIPING

HOUSEKEEPING CURBS

DETAIL A VAR.

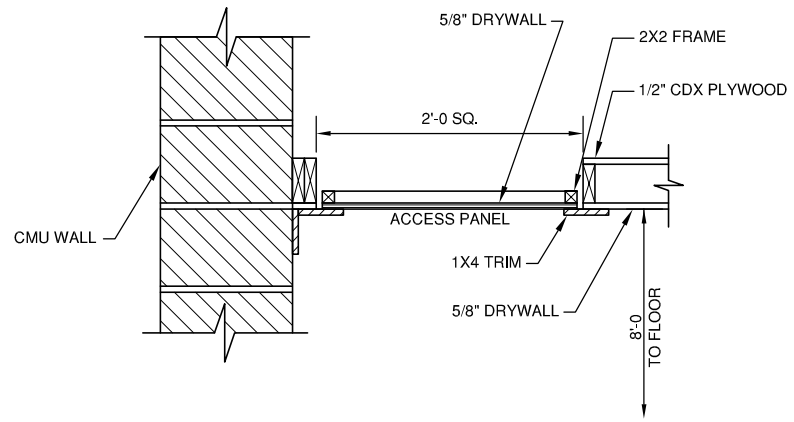


ELEVATION

CIRCULAR DUCTWORK

ELEVATION

RECTANGULAR DUCTWORK

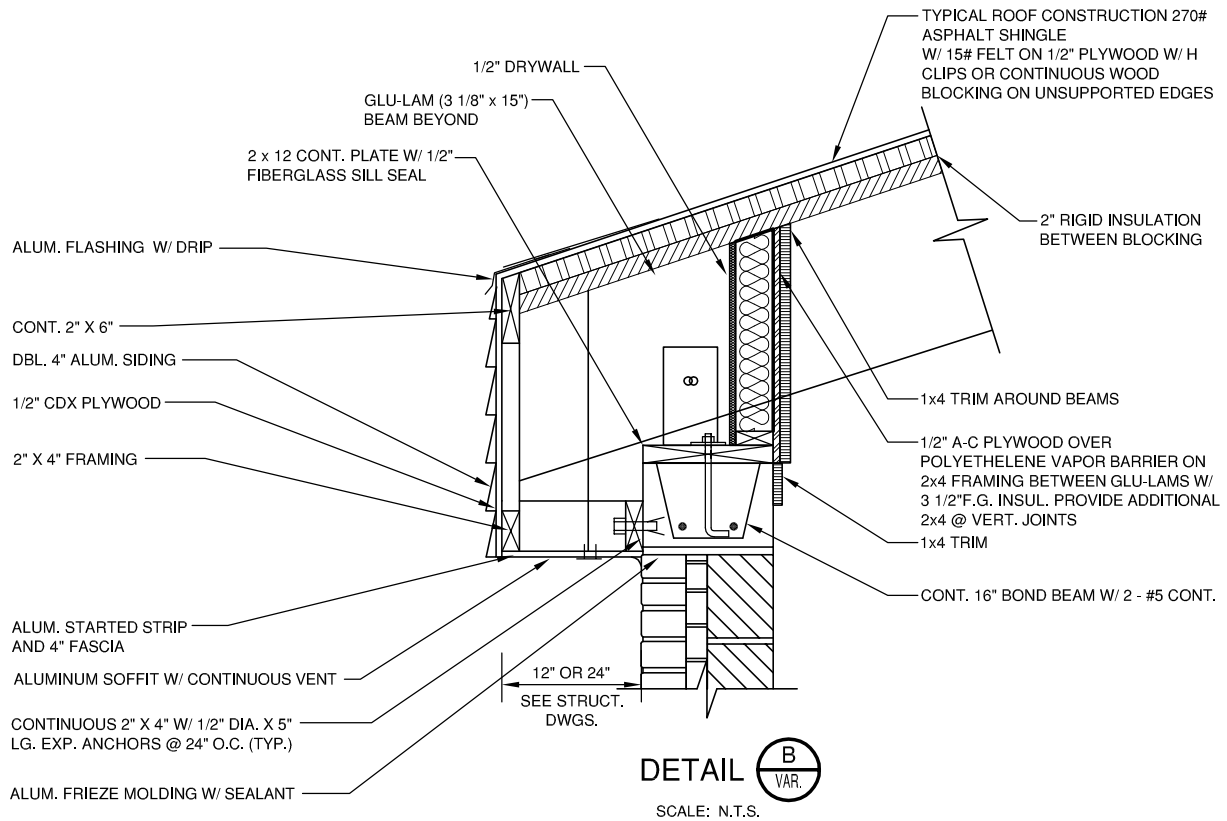


NOTES:
1. SEE DWG. 100-AS-01 FOR LOCATION.

2. IN ELECTRICAL ROOM PROVIDE 2-5/8" DRYWALL.

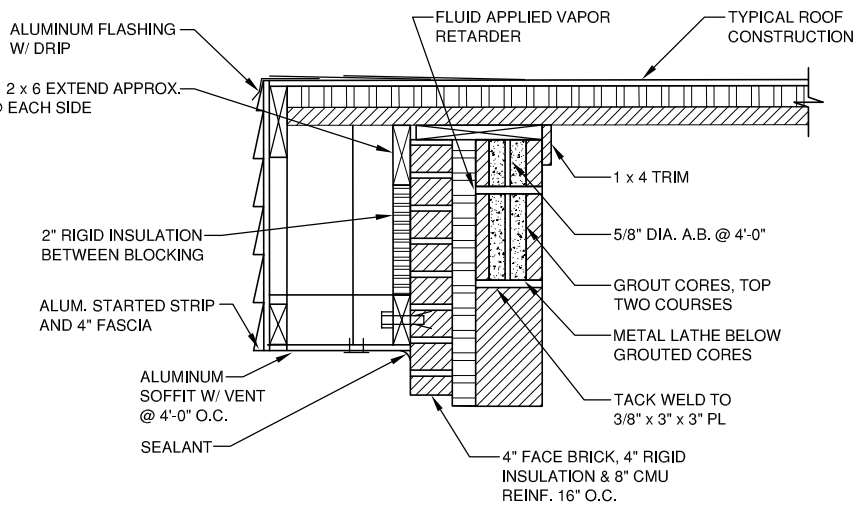
CEILING ACCESS DETAIL C VAR.

SCALE: N.T.S.



DETAIL B VAR.

SCALE: N.T.S.



DETAIL D VAR.

SCALE: N.T.S.

SA.	Consultant: Robert E. Lee & Associates, Inc.	CITY OF OAK CREEK, WISCONSIN		APPROVED BY UTILITY ENGINEER DATE
ST.		DESIGNED BY DATE: D.A.M. 8/13/09	DRAWN BY DATE: R.L.B. 8/13/09	CHECKED BY DATE: K.A.K. 8/13/09
W.				APPROVED BY CITY ENGINEER DATE
G.	ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES	ARCHITECTURAL DETAILS		SCALE: PLAN HOR. N.T.S., PROFILE HOR. N.T.S. VER. N.T.S.
E.		IN: PUETZ ROAD BOOSTER STATION		SHEET: 43 OF 53
T.	4664 GOLDEN POND PARK CT. HOBART, WISCONSIN 54155 PHONE: 920-662-9641 FAX: 920-662-9141 WWW.RELEEINC.COM			
I.				
TS.				
PP.				
	REVISION BY DATE	FILE NO: 08101		200-AS-05

File: K:\4900\4931\4931001\dwg\ROOF DETAILS.dwg
Plot Date: Sep 01, 2009 3:55pm

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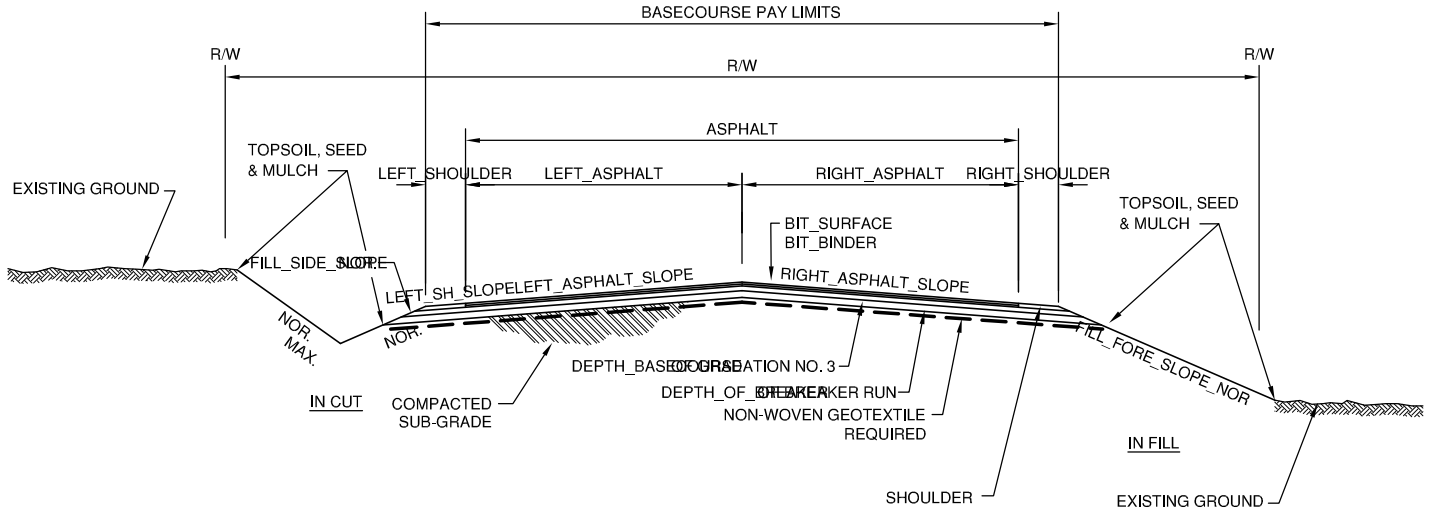
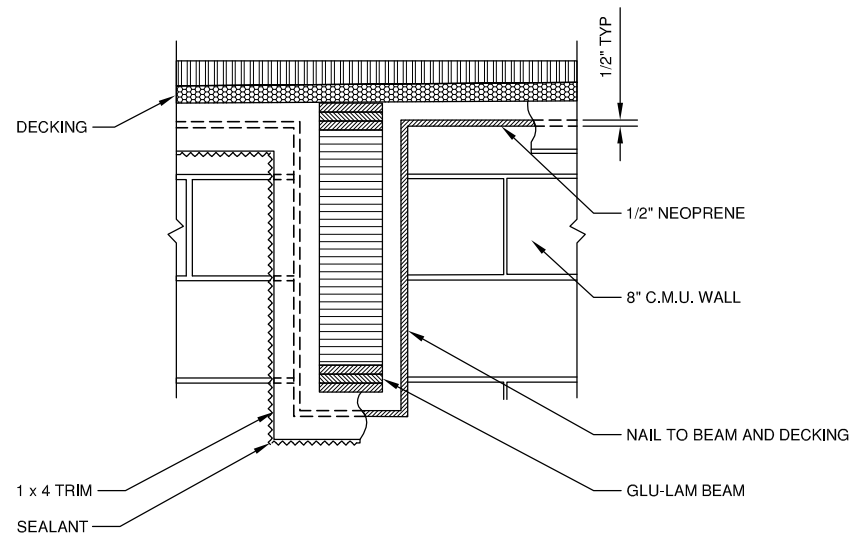
PLAN VIEW: PLAN



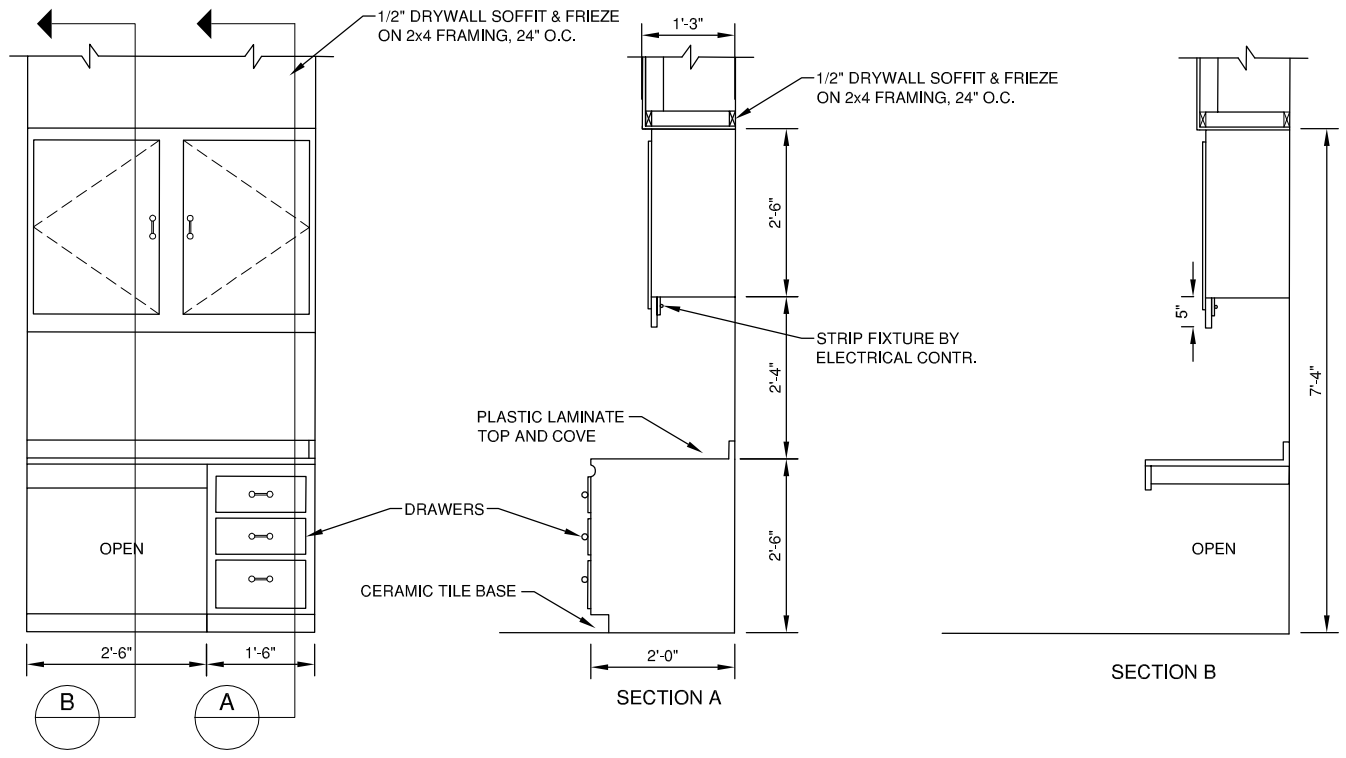
TYPICAL RURAL STREET CROSS SECTION



GLU-LAM BEAM DETAIL

E
100-AS-01

SCALE: 1-1/2" = 1'-0"



OFFICE DESK DETAIL

SCALE: 3/4" = 1'

SA.	Consultant: Robert E. Lee & Associates, Inc.	CITY OF OAK CREEK, WISCONSIN	APPROVED BY UTILITY ENGINEER DATE
ST.		DESIGNED BY DATE: D.A.M. 8/13/09 | DRAWN BY DATE: R.L.B. 8/13/09 | CHECKED BY DATE: K.A.K. 8/13/09	APPROVED BY CITY ENGINEER DATE
W.			
G.			
E.	ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES	ARCHITECTURAL DETAILS	SCALE: PLAN HOR. N.T.S. / PROFILE HOR. N.T.S. VER. N.T.S.
T.			SHEET: 44 OF 53
I.	4664 GOLDEN POND PARK CT. HOBART, WISCONSIN 54155 PHONE: 920-662-9641 FAX: 920-662-9141 WWW.RELEEINC.COM	IN: PUETZ ROAD BOOSTER STATION	
TS.			
PP.			
	REVISION BY DATE	FILE NO: 08101	200-AS-06

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Plot Date: May 01, 2009 - 2:07pm
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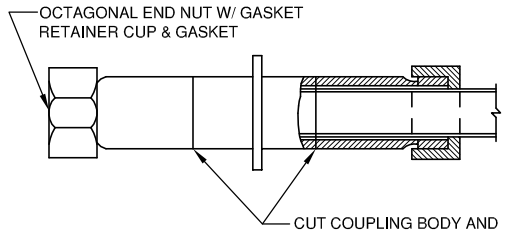
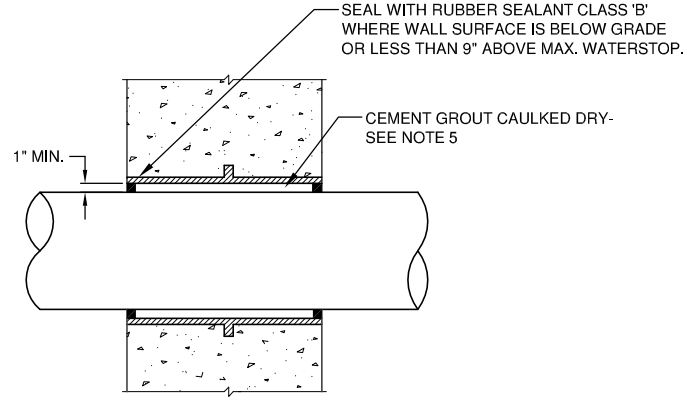
PLAN VIEW: PLAN

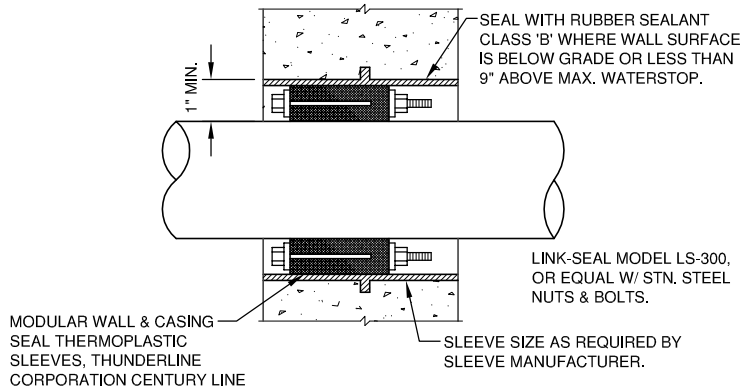


P-1

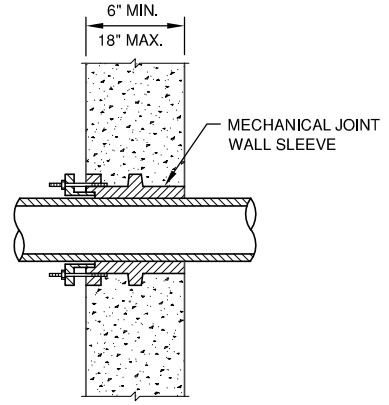
(FOR PIPES 2" & SMALLER)
WHERE SPECIFIED



P-2



P-3



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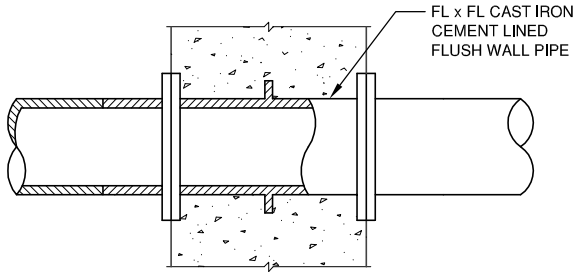

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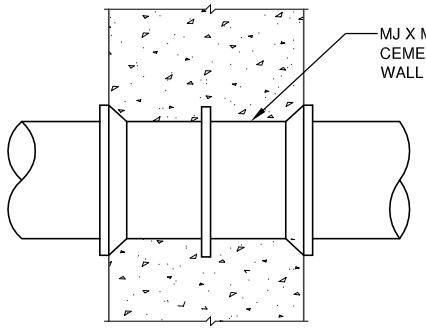
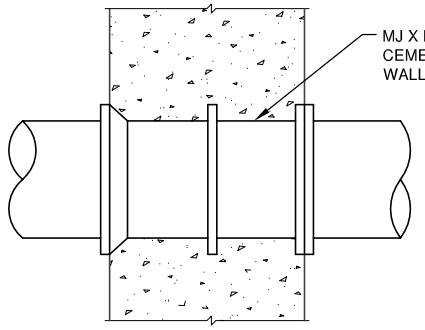
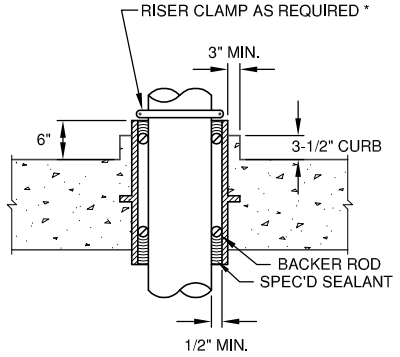


P-6



P-7



* FOR INSUALATED PIPES, EXTEND INSULATION THROUGH SLEEVE AND COVER CLAMP.

P-8

(FOR INTERMEDIATE FLOORS, PASSAGE TO PASSAGE)

PIPES THROUGH WALLS

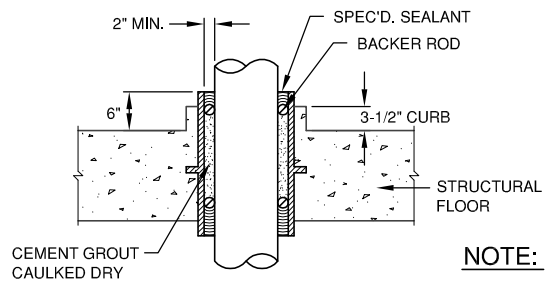
PIPE MATERIAL

CONDITION	STEEL	COPPER	PVC	IRON
EARTH TO PASSAGE	P-1	P-1	P-1	P-3
LIQUID TO PASSAGE	P-4	P-2	P-2	P-4
LIQUID TO EARTH	P-1	P-2	P-2	P-3
PASSAGE TO PASSAGE	P-1	P-1	P-1	P-1
LIQUID TO LIQUID	P-4	P-1	P-1	P-4

P-2 MAY BE USED IN LIEU OF P-1, P-3, & P-4

NOTES:

1. WHERE PIPES PASS THOUGH WALLS, FLOORS, OR CEILINGS, THE METHOD USED SHALL CONFORM TO THE STANDARD DETAILS AS SHOWN IN THESE PLANS AND ON THIS DRAWING, EXCEPT WHERE SPECIAL DETAILS ARE SHOWN.
2. PASSAGE SHALL MEAN ANY ROOM, GALLERY, TUNNEL, OR SIMILAR ENCLOSED SPACE IN WHICH PIPES RUN.
3. ALL SLEEVES SHALL BE TYPE 304 STAINLESS STEEL.
4. FLANGES MAY BE INSTALLED FLUSH WITH WALL AND TAPPED FOR STUDS.
5. CEMENT GROUT CAULKING MAY BE ELIMINATED FOR PASSAGE TO PASSAGE PENETRATIONS EXCEPT WHERE THERE IS A CHANGE IN ELECTRICAL CLASSIFICATION.
6. LIQUID SHALL MEAN AN ELEVATION 9" ABOVE MAXIMUM WATER ELEVATION.

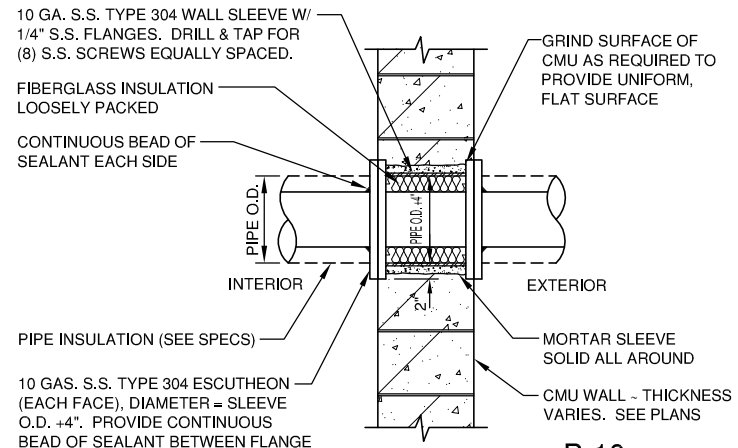


P-9

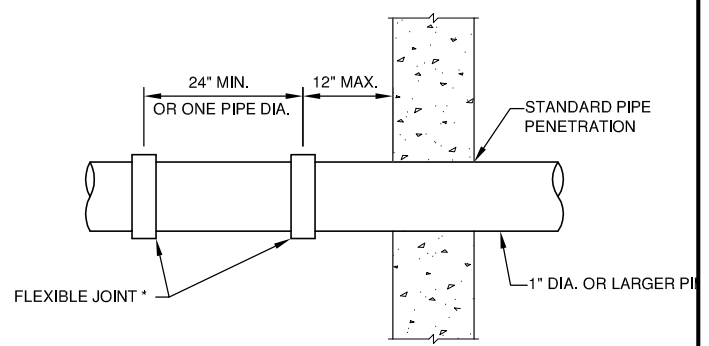
(FOR INTERMEDIATE FLOORS)

NOTE:

MECHANICAL CONTRACTOR SHALL PROVIDE CURBS AROUND ALL FLOOR PENETRATIONS UNLESS DIRECTED OTHERWISE BY THE ENGINEER. SEE CONCRETE SPECIFICATION SECTIONS.

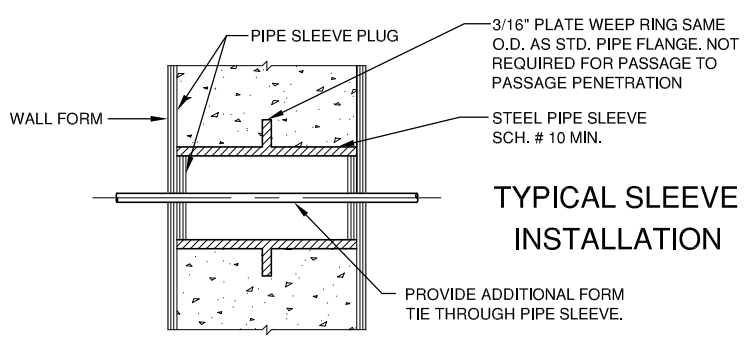


P-10



* FLEXIBLE JOINTS ARE MECHANICAL JOINTS. PUSH ON JOINTS & MECHANICAL PIPE COUPLINGS.

TYPICAL UNDERGROUND PIPING AT WALL



TYPICAL SLEEVE INSTALLATION

SA.
ST.
W.
G.
E.
T.
I.
TS.
PP.

Consultant:

Robert E. Lee & Associates, Inc.

ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES

4664 GOLDEN POND PARK CT.
HOBART, WISCONSIN 54155
PHONE: 920-662-9641
FAX: 920-662-9141
WWW.RELEEINC.COM

REVISION BY DATE

CITY OF OAK CREEK, WISCONSIN

DESIGNED BY	DATE	DRAWN BY	DATE	CHECKED BY	DATE
D.A.M.	8/13/09	R.L.B.	8/13/09	K.A.K.	8/13/09

PIPE PENETRATION DETAILS
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY

UTILITY ENGINEER DATE

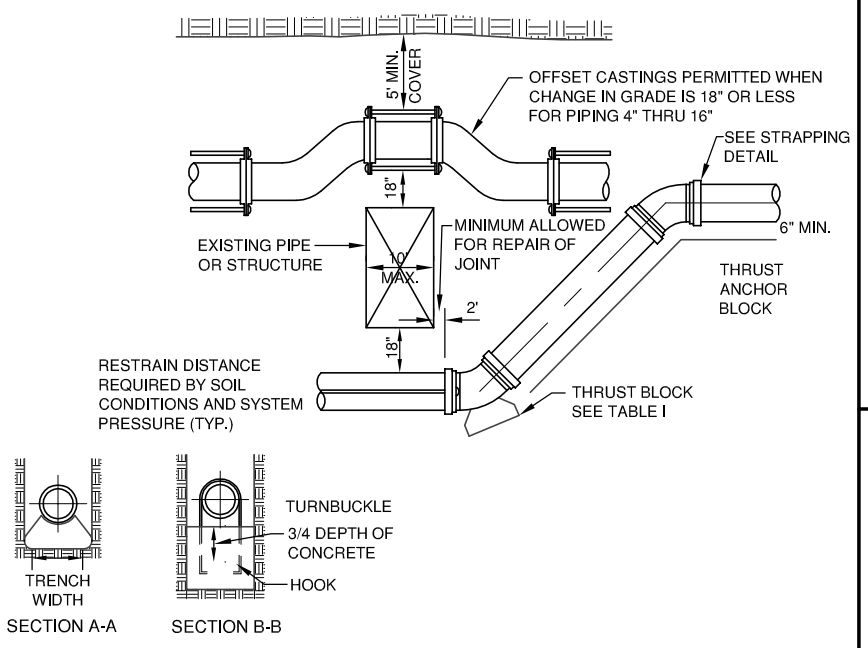
APPROVED BY

CITY ENGINEER DATE

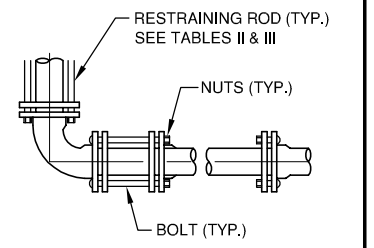
SCALE	SHEET
PLAN HOR. N.T.S.	45
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

200-M-01

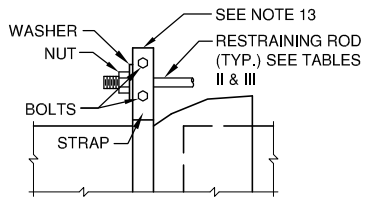
File: K:\4900\4931\4931001\dwg\PIPE PENETRATION DETAILS.dwg
Plot Date: Sep 01, 2009 - 3:39pm
LAYOUT: LAYOUT1
PLAN VIEW: PLAN



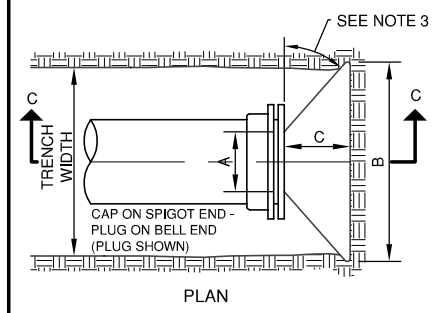
DETAIL FOR PRESSURE PIPE OFFSET

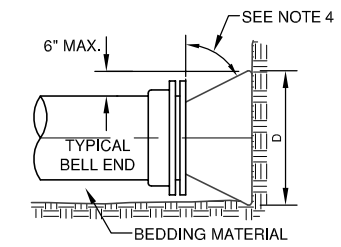


RESTRAINING ROD DETAIL FOR MECHANICAL JOINT PIPE

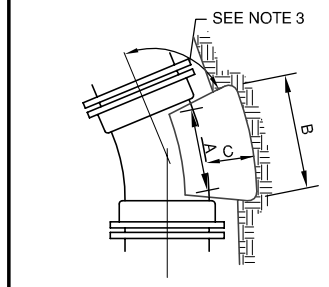


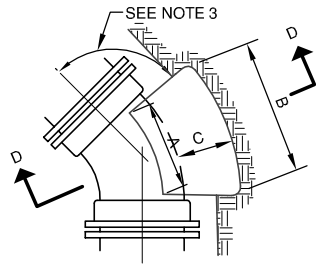
STRAPPING DETAIL

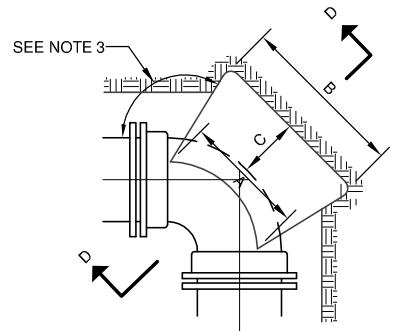


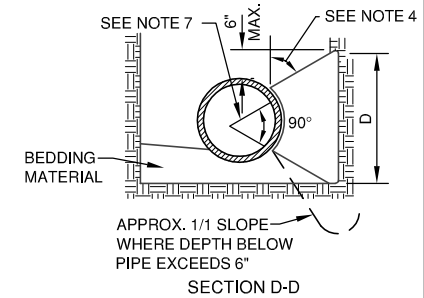


THRUST BLOCK DETAILS FOR DEAD END

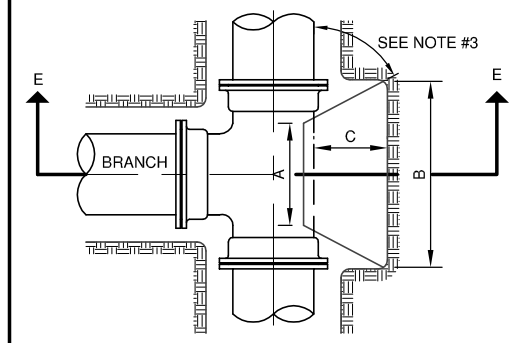


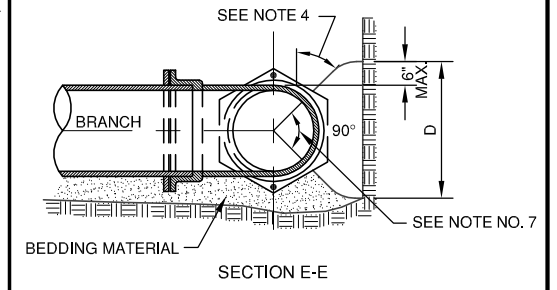






THRUST BLOCK DETAILS FOR BENDS





THRUST BLOCK DETAILS FOR TEES

TABLE NO. II

RESTRAINING ROD REQUIREMENTS FOR MECHANICAL JOINT PIPING SYSTEMS

0-50 PSI TEST PRESSURE — NUMBER & SIZE OF RESTRAINING RODS						51-100 PSI TEST PRESSURE — NUMBER & SIZE OF RESTRAINING RODS						101-150 PSI TEST PRESSURE — NUMBER & SIZE OF RESTRAINING RODS					
NOM. PIPE DIA.	DEAD END	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND	NOM. PIPE DIA.	DEAD END	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND	NOM. PIPE DIA.	DEAD END	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND
4	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	4	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	4	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"
6	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	6	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	6	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"
8	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	8	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	8	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"
10	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	10	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	10	(4) 3/4"	(4) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"
12	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	12	(4) 3/4"	(4) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	12	(4) 3/4"	(4) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"
14	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	14	(4) 3/4"	(4) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	14	(5) 3/4"	(5) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"
16	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	16	(4) 3/4"	(4) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	16	(6) 3/4"	(6) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"
18	(3) 3/4"	(3) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	18	(6) 3/4"	(6) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	18	(8) 3/4"	(8) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"
20	(4) 3/4"	(4) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	20	(6) 3/4"	(6) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	20	(10) 3/4"	(10) 3/4"	(3) 3/4"	(2) 3/4"	(2) 3/4"
24	(4) 3/4"	(4) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	24	(8) 3/4"	(8) 3/4"	(3) 3/4"	(2) 3/4"	(2) 3/4"	24	(12) 3/4"	(12) 3/4"	(4) 3/4"	(2) 3/4"	(2) 3/4"
30	(4) 1"	(4) 1"	(2) 1"	(2) 1"	(2) 1"	30	(7) 1"	(7) 1"	(2) 1"	(2) 1"	(2) 1"	30	(10) 1"	(10) 1"	(3) 1"	(2) 1"	(2) 1"
36	(5) 1"	(5) 1"	(2) 1"	(2) 1"	(2) 1"	36	(10) 1"	(10) 1"	(3) 1"	(2) 1"	(2) 1"	36	(15) 1"	(15) 1"	(5) 1"	(2) 1"	(2) 1"
42	(4) 1-1/4"	(4) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	42	(8) 1-1/4"	(8) 1-1/4"	(3) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	42	(12) 1-1/4"	(12) 1-1/4"	(4) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"
48	(6) 1-1/4"	(6) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	48	(11) 1-1/4"	(11) 1-1/4"	(3) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	48	(16) 1-1/4"	(16) 1-1/4"	(5) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"
54	(7) 1-1/4"	(7) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	54	(14) 1-1/4"	(14) 1-1/4"	(4) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	54	(20) 1-1/4"	(20) 1-1/4"	(6) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"

NOTE:
CONTRACTOR SHALL VERIFY COMPATIBILITY OF BOLTS WITH MECHANICAL CONNECTORS SELECTED.

TABLE NO. III

RESTRAINING ROD REQUIREMENTS FOR FLANGED PIPING SYSTEMS

0-50 PSI TEST PRESSURE — NUMBER & SIZE OF RESTRAINING RODS						51-100 PSI TEST PRESSURE — NUMBER & SIZE OF RESTRAINING RODS						101-150 PSI TEST PRESSURE — NUMBER & SIZE OF RESTRAINING RODS					
NOM. PIPE DIA.	DEAD END	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND	NOM. PIPE DIA.	DEAD END	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND	NOM. PIPE DIA.	DEAD END	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND
4	(2) 5/8"	(2) 5/8"	(2) 5/8"	(2) 5/8"	(2) 5/8"	4	(2) 5/8"	(2) 5/8"	(2) 5/8"	(2) 5/8"	(2) 5/8"	4	(2) 5/8"	(2) 5/8"	(2) 5/8"	(2) 5/8"	(2) 5/8"
6	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	6	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	6	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"
8	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	8	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	8	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"	(2) 3/4"
10	(2) 7/8"	(2) 7/8"	(2) 7/8"	(2) 7/8"	(2) 7/8"	10	(2) 7/8"	(2) 7/8"	(2) 7/8"	(2) 7/8"	(2) 7/8"	10	(2) 7/8"	(2) 7/8"	(2) 7/8"	(2) 7/8"	(2) 7/8"
12	(2) 7/8"	(2) 7/8"	(2) 7/8"	(2) 7/8"	(2) 7/8"	12	(2) 7/8"	(2) 7/8"	(2) 7/8"	(2) 7/8"	(2) 7/8"	12	(2) 7/8"	(2) 7/8"	(2) 7/8"	(2) 7/8"	(2) 7/8"
14	(2) 1"	(2) 1"	(2) 1"	(2) 1"	(2) 1"	14	(2) 1"	(2) 1"	(2) 1"	(2) 1"	(2) 1"	14	(2) 1"	(2) 1"	(2) 1"	(2) 1"	(2) 1"
16	(2) 1"	(2) 1"	(2) 1"	(2) 1"	(2) 1"	16	(4) 1"	(2) 1"	(2) 1"	(2) 1"	(2) 1"	16	(4) 1"	(4) 1"	(2) 1"	(2) 1"	(2) 1"
18	(2) 1-1/8"	(2) 1-1/8"	(2) 1-1/8"	(2) 1-1/8"	(2) 1-1/8"	18	(4) 1-1/8"	(4) 1-1/8"	(2) 1-1/8"	(2) 1-1/8"	(2) 1-1/8"	18	(4) 1-1/8"	(4) 1-1/8"	(2) 1-1/8"	(2) 1-1/8"	(2) 1-1/8"
20	(2) 1-1/8"	(2) 1-1/8"	(2) 1-1/8"	(2) 1-1/8"	(2) 1-1/8"	20	(4) 1-1/8"	(4) 1-1/8"	(2) 1-1/8"	(2) 1-1/8"	(2) 1-1/8"	20	(4) 1-1/8"	(4) 1-1/8"	(2) 1-1/8"	(2) 1-1/8"	(2) 1-1/8"
24	(2) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	24	(4) 1-1/4"	(4) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	24	(4) 1-1/4"	(4) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"
30	(3) 1-1/4"	(3) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	30	(5) 1-1/4"	(5) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	30	(5) 1-1/4"	(5) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"	(2) 1-1/4"
36	(3) 1-1/2"	(3) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"	36	(5) 1-1/2"	(5) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"	36	(5) 1-1/2"	(5) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"
42	(4) 1-1/2"	(4) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"	42	(6) 1-1/2"	(6) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"	42	(6) 1-1/2"	(6) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"
48	(4) 1-1/2"	(4) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"	48	(8) 1-1/2"	(8) 1-1/2"	(3) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"	48	(8) 1-1/2"	(8) 1-1/2"	(3) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"
54	(6) 1-1/2"	(6) 1-1/2"	(3) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"	54	(12) 1-1/2"	(12) 1-1/2"	(4) 1-1/2"	(2) 1-1/2"	(2) 1-1/2"	54	(16) 1-1/2"	(16) 1-1/2"	(6) 1-1/2"	(3) 1-1/2"	(2) 1-1/2"

TABLE NO. I

THRUST BLOCK AREA REQUIRED

0-50 PSI TEST PRESSURE — THRUST AREA REQUIRED FT.^{2}						51-100 PSI TEST PRESSURE — THRUST AREA REQUIRED FT.^{2}						101-150 PSI TEST PRESSURE — THRUST AREA REQUIRED FT.^{2}					
NOM. PIPE DIA.	DEAD END	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND	NOM. PIPE DIA.	DEAD END	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND	NOM. PIPE DIA.	DEAD END	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND
4	1.0	1.0	1.0	1.0	1.0	4	1.0	2.0	2.0	1.0	1.0	4	2.0	2.0	2.0	1.0	1.0
6	1.0	2.0	1.0	1.0	1.0	6	2.0	3.0	2.0	1.0	1.0	6	3.0	4.0	2.0	1.0	1.0
8	2.0	3.0	1.0	1.0	1.0	8	3.0	5.0	3.0	2.0	1.0	8	5.0	7.0	4.0	2.0	1.0
10	3.0	3.0	2.0	1.0	1.0	10	5.0	7.0	4.0	2.0	1.0	10	8.0	11.0	6.0	3.0	2.0
12	4.0	5.0	3.0	2.0	1.0	12	7.0	10.0	5.0	3.0	2.0	12	10.0	15.0	8.0	4.0	2.0
14	5.0	7.0	4.0	2.0	1.0	14	9.0	13.0	7.0	4.0	2.0	14	14.0	22.0	11.0	6.0	3.0
16	6.0	7.0	5.0	3.0	1.0	16	12.0	17.0	9.0	5.0	3.0	16	18.0	25.0	14.0	7.0	4.0
18	8.0	11.0	6.0	3.0	2.0	18	15.0	21.0	12.0	6.0	3.0	18	23.0	32.0	17.0	9.0	5.0
20	9.0	13.0	7.0	4.0	2.0	20	19.0	26.0	14.0	7.0	4.0	20	28.0	39.0	21.0	11.0	6.0
24	13.0	19.0	10.0	5.0	3.0	24	26.0	37.0	20.0	10.0	5.0	24	39.0	56.0	30.0	15.0	8.0
30	20.0	29.0	16.0	8.0	4.0	30	40.0	57.0	31.0	16.0	8.0	30	61.0	86.0	46.0	24.0	12.0
36	29.0	41.0	22.0	12.0	6.0	36	58.0	82.0	44.0	23.0	12.0	36	87.0	122.0	66.0	34.0	17.0
42	39.0	55.0	30.0	15.0	7.0	42	78.0	110.0	60.0	31.0	15.0	42	117.0	165.0	90.0	46.0	23.0
48	51.0	72.0	39.0	20.0	10.0	48	102.0	144.0	78.0	40.0	20.0	48	152.0	215.0	117.0	60.0	30.0
54	64.0	91.0	49.0	25.0	13.0	54	128.0	181.0	98.0	50.0	25.0	54	194.0	272.0	147.0	75.0	38.0

NOTES:

1. WHERE A HORIZONTAL BEND IS MADE, THE PIPING SHALL BE RESTRAINED BY MEANS OF A THRUST BLOCK AS DETAILED ON THIS SHEET. WHERE VERTICAL OFFSETS ARE MADE, THE TOP BEND SHALL BE RESTRAINED BY RESTRAINING RODS, OR A COMBINATION OF BOTH, THE BOTTOM BENDS SHALL BE RESTRAINED BY THRUST BLOCKS AS DETAILED.
2. "A", "B", AND "D" DIMENSIONS SHALL BE AS LARGE AS POSSIBLE WITHOUT INTERFERING WITH THE MECHANICAL JOINTS OR THE M.J. BOLTS.
3. "C" DIMENSIONS SHALL BE LARGE ENOUGH TO MAKE ANGLE EQUAL TO OR LARGER THAN 45°.
4. ANGLE SHALL BE EQUAL TO OR LARGER THAN 45°.
5. "B" & "D" DIMENSIONS SHALL PROVIDE REQUIRED BLOCKING AREA AS LISTED IN TABLE I. REFER TO PIPE SCHEDULE IN THE SPECIFICATIONS FOR THE PRESSURE RATING OF THE PIPING SYSTEMS.
6. HARD WOOD BLOCKING MAY BE USED IN LIEU OF CONCRETE BUTTRESSES FOR TEES, DEAD ENDS, 90 BENDS AND 45 BENDS HAVING A SIZE OF 4 IN., 6 IN. AND 8 IN. AND FOR 11-1/4 AND 22-1/2 BENDS HAVING A SIZE OF 4 IN., 6 IN., 8 IN. AND 12 IN., PROVIDED THE AREA OF THE BLOCKING IN CONTACT WITH THE UNDISTURBED SOIL IS AT LEAST EQUAL TO THE AREA OF THE CONCRETE SHOWN IN TABLE 1. REFER TO "PIPE SYSTEM SPECIFICATION" IN THE CONTRACT SPECIFICATION FOR THE PRESSURE RATING OF THE PIPING SYSTEMS.
7. CONCRETE SHALL BEAR ON ONE FULL QUADRANT OF PIPE AS A MINIMUM, SEE DETAIL ABOVE.
8. WHERE THRUST BLOCKS ARE NOT POSSIBLE BECAUSE OF POOR SOIL CONDITIONS OR LACK OF ROOM, STRAPPING SHALL BE PERMITTED. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW A LIST OF RESTRAINT MATERIAL, DETAILS OF THE RESTRAINT AND METHODS OF CONSTRUCTION, AND SIZES OF ALL RESTRAINT MEMBERS HE DESIRES TO USE FOR THRUST ANCHOR BLOCKS, RESTRAINING RODS AND STRAPS. REFER TO PIPE SCHEDULE IN THE SPECIFICATIONS FOR THE PRESSURE RATING OF THE PIPING SYSTEMS.
9. THE THRUST BLOCK AREAS SHOWN IN TABLE I ARE CALCULATED USING A SOIL BEARING CAPACITY OF 2000 PSF. IF GREATER SOIL BEARING CAPACITY IS AVAILABLE, THE CONTRACTOR MAY, AFTER REVIEW BY THE ENGINEER, REDUCE THE THRUST BLOCK AREAS SHOWN ON TABLE I. THE THRUST BLOCK AREA SHALL BE INCREASED IF THE SOIL IS NOT CAPABLE OF PROVIDING 2000 PSF SOIL BEARING CAPACITY.
10. THE CONCRETE BUTTRESSES SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI.
11. IF THE CONTRACTOR DESIRES TO USE ALTERNATE METHODS OF RESTRAINT, HE SHALL SUBMIT A RESTRAINT SCHEDULE TO THE ENGINEER FOR REVIEW DETAILING THE SYSTEM THAT HE PROPOSES TO USE.
12. RESTRAINT RODS FOR BOTH INTERIOR AND EXTERIOR PIPING SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE NUMBER AND SIZE LISTED IN TABLE II AND/OR TABLE III. THE NUMBER AND SIZE OF RESTRAINING RODS IN TABLE II AND/OR TABLE III ARE CALCULATED USING ASTM A307 STEEL. THE RESTRAINT RODS SHALL BE ANCHORED TO PROVIDE A RIGID PIPING SYSTEM. THE CONTRACTOR SHALL SUBMIT DETAILS OF THE RESTRAINT SYSTEM TO THE ENGINEER FOR REVIEW. ALL RESTRAINING RODS SHALL BE EQUALLY SPACED AROUND THE CIRCUMFERENCE OF THE PIPE. INTERIOR RESTRAINING RODS SHALL BE PAINTED THE SAME PAINTING SYSTEM SPECIFIED FOR THE PIPING SYSTEM. EXTERIOR RESTRAINING RODS AND MISCELLANEOUS STEEL MATERIALS SHALL BE PROTECTED AS REQUIRED BY CONTRACT SPECIFICATIONS.
13. THE CONTRACTOR SHALL SIZE ALL STRAPS, BOLTS AND WASHERS TO BE COMPATIBLE WITH THE STRENGTH OF THE RESTRAINING RODS AND THE DETAILS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW.
14. THE CONTRACTOR SHALL REFER TO THE LATEST EDITION OF "A GUIDE FOR THE INSTALLATION OF DUCTILE IRON PIPE" PUBLISHED BY THE CAST IRON PIPE RESEARCH ASSOCIATION FOR DESIGN AND INSTALLATION OF RESTRAINT SYSTEMS.
15. WHERE APPROVED BY THE ENGINEER, MECHANICAL JOINT RESTRAINTS, "MEGALUG" BY EBAA IRON SALES, INC., OR EQUAL, MAY BE USED IN LIEU OF THRUST BLOCKS OR RESTRAINING RODS.

SA. ST. W. G. E. T. I. TS. PP.

Consultant:
Robert E. Lee & Associates, Inc.
ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES
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HOBART, WISCONSIN 54155
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FAX: 920-662-9141
WWW.RELEEINC.COM

REVISION BY DATE

CITY OF OAK CREEK, WISCONSIN

DESIGNED BY	DATE	DRAWN BY	DATE	CHECKED BY	DATE
D.A.M.	8/13/09	R.L.B.	8/13/09	K.A.K.	8/13/09

THRUST BLOCKING DETAILS
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	46
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

200-M-02

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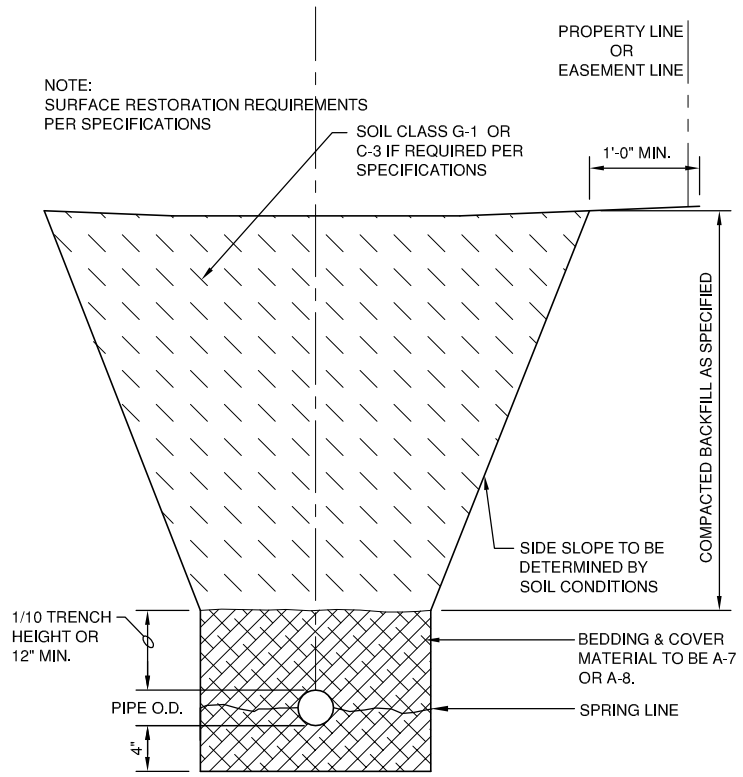
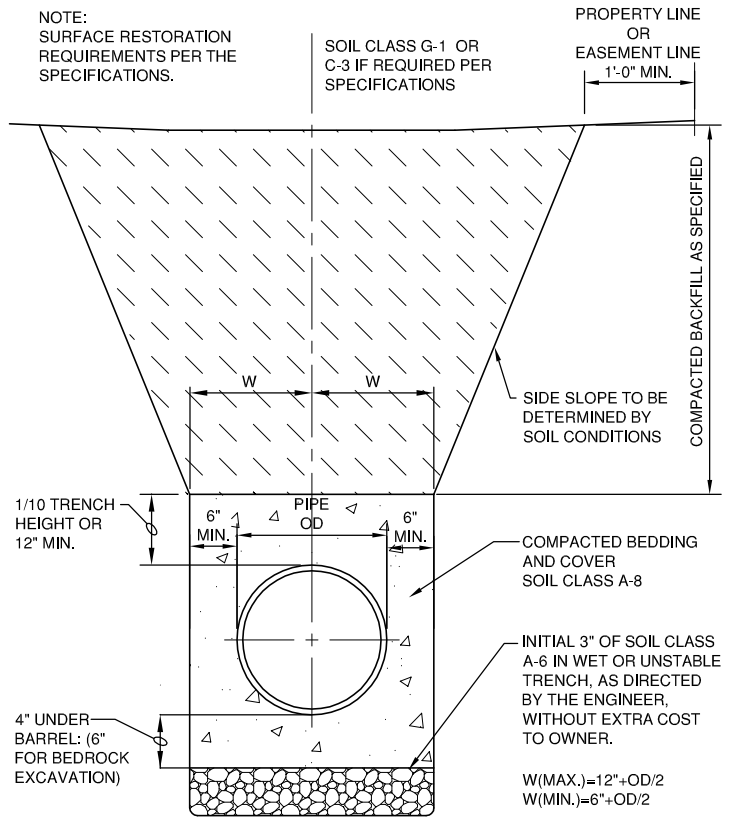
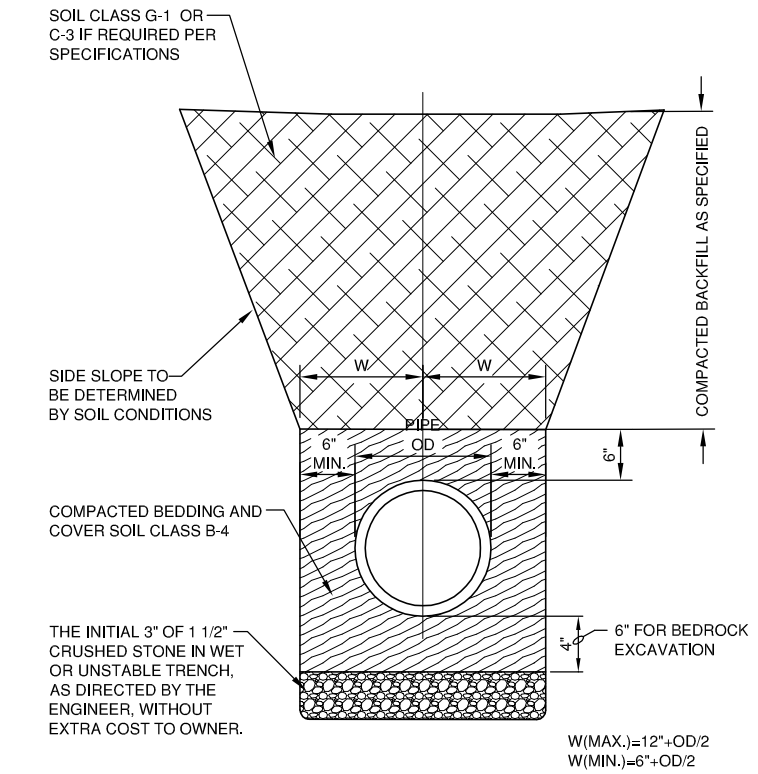
PLAN VIEW: PLAN



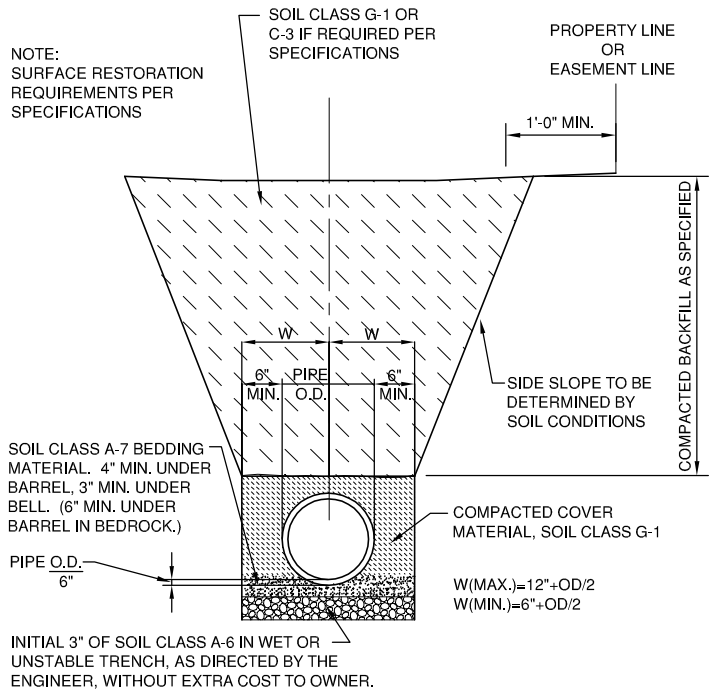
SMALL DIAMETER PIPING (UNDER 4" DIA.) PVC, COPPER, STEEL, AND POLYETHYLENE



P.V.C. SEWER & WATERMAIN & FORCEMAIN BEDDING & TRENCH SECTION



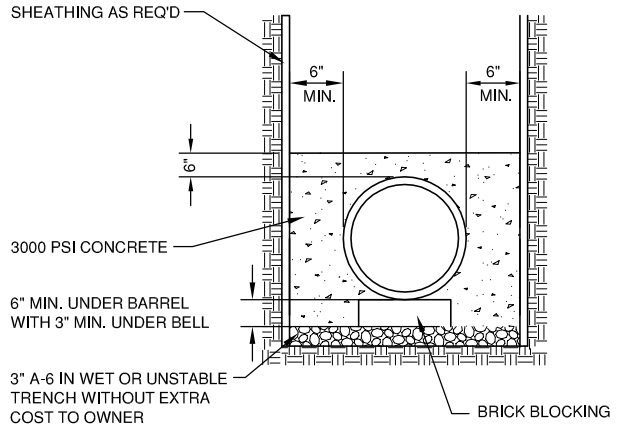
DUCTILE IRON BEDDING & TRENCH SECTION



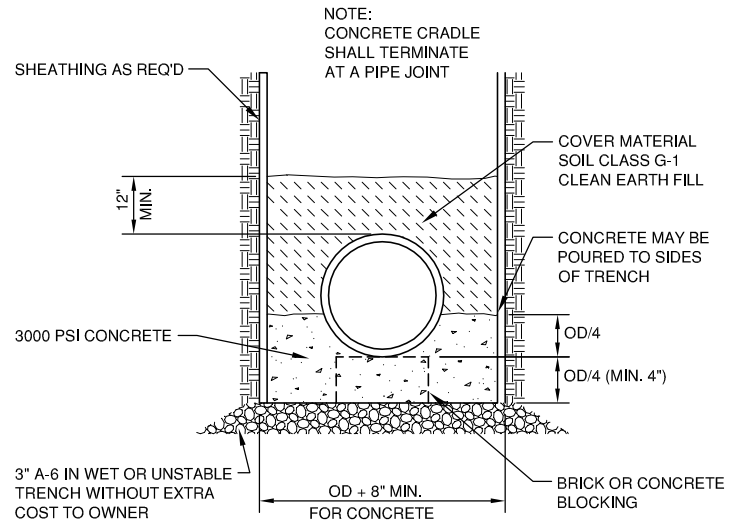
CONCRETE PIPE BEDDING & TRENCH SECTION

NOTES:

1. BRACE PIPE TO PREVENT FLOATATION OR SHIFTING.
2. CONCRETE ENCASEMENT SHALL TERMINATE AT A PIPE JOINT.



CONCRETE ENCASEMENT BEDDING



CONCRETE PIPE CRADLE BEDDING

SA.	Consultant: Robert E. Lee & Associates, Inc.	CITY OF OAK CREEK, WISCONSIN			APPROVED BY UTILITY ENGINEER DATE
ST.		DESIGNED BY DATE	DRAWN BY DATE	CHECKED BY DATE	APPROVED BY
W.		D.A.M. 8/13/09	R.L.B. 8/13/09	K.A.K. 8/13/09	CITY ENGINEER DATE
G.					SCALE / SHEET
E.	ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES	PIPE BEDDING DETAILS			PLAN HOR. N.T.S.
T.		IN: PUETZ ROAD BOOSTER STATION			47 OF 53
I.					PROFILE HOR. N.T.S. VER. N.T.S.
TS.	4664 GOLDEN POND PARK CT. HOBART, WISCONSIN 54155 PHONE: 920-662-9641 FAX: 920-662-9141 WWW.RELEEINC.COM				
PP.					
	REVISION BY DATE	FILE NO: 08101			200-M-03

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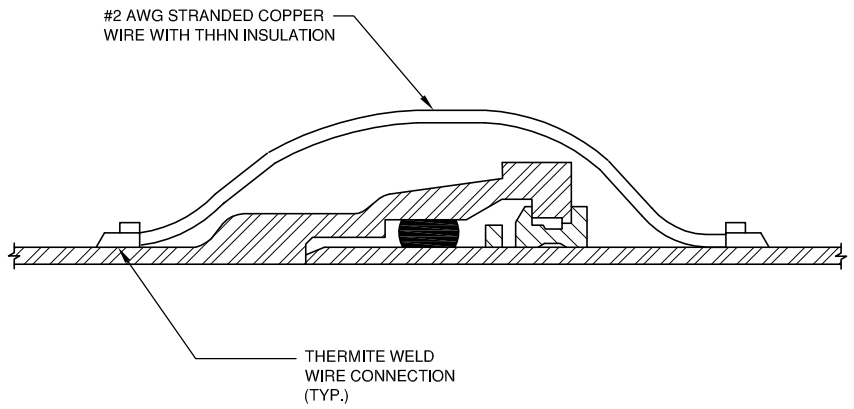
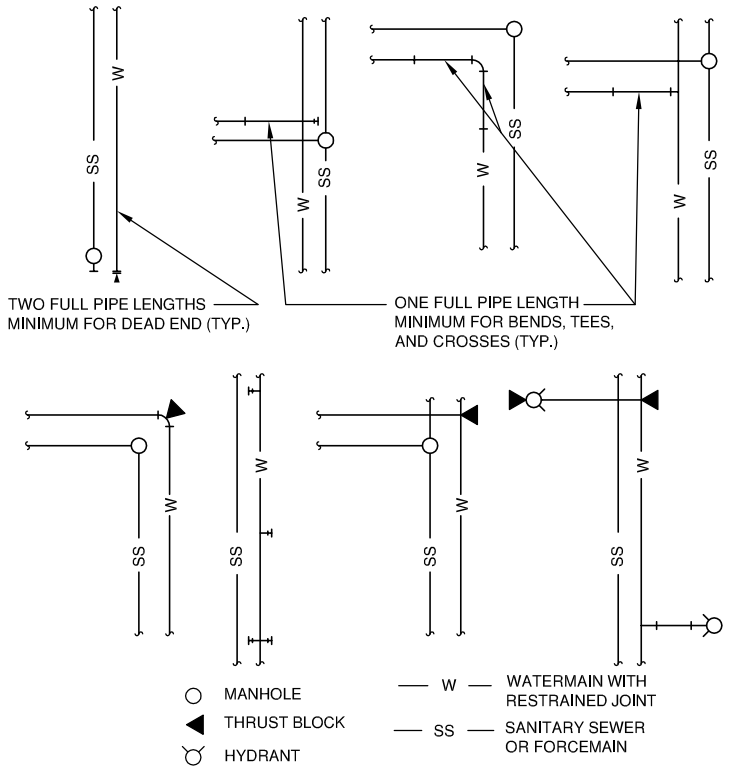
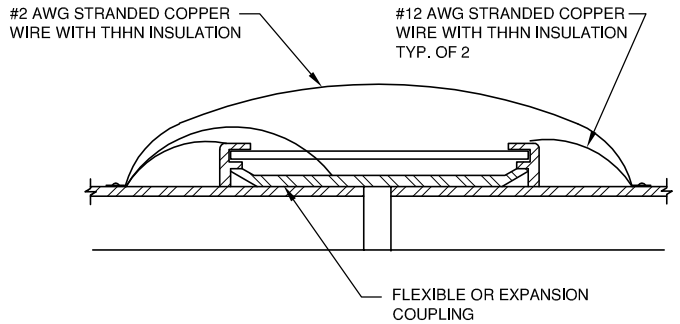
PLAN VIEW: PLAN



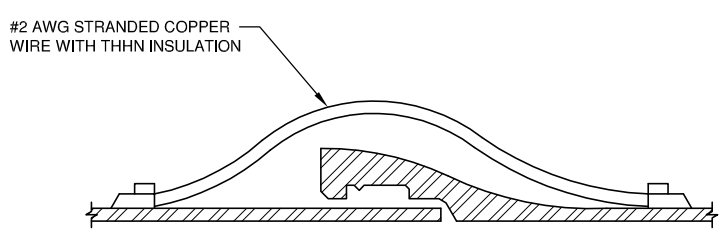
RESTRAINED JOINT BOND



TYPICAL WATERMAIN RESTRAINT
REQUIREMENTS FOR COMMON
TRENCH CONSTRUCTION



FLEXIBLE JOINT BOND



PUSH-ON JOINT BOND

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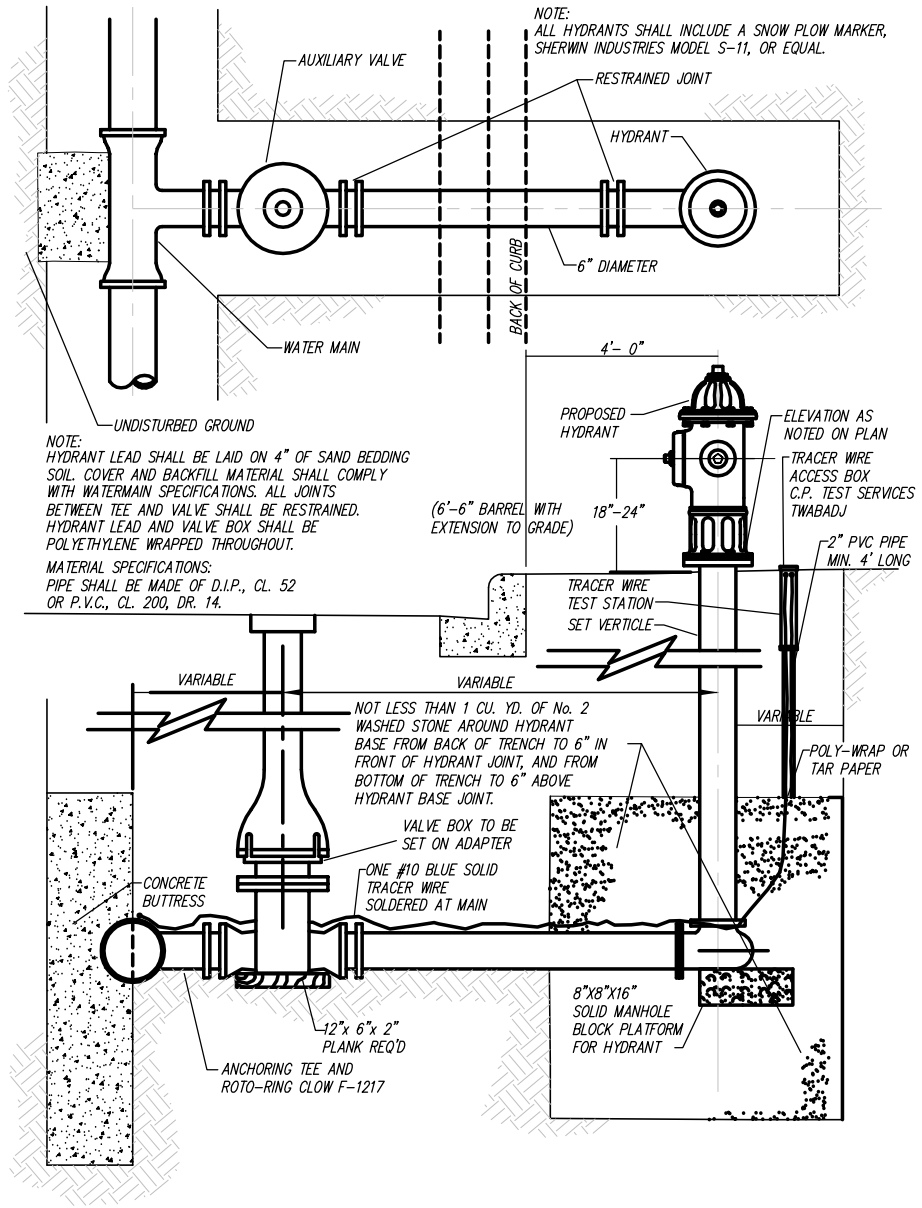
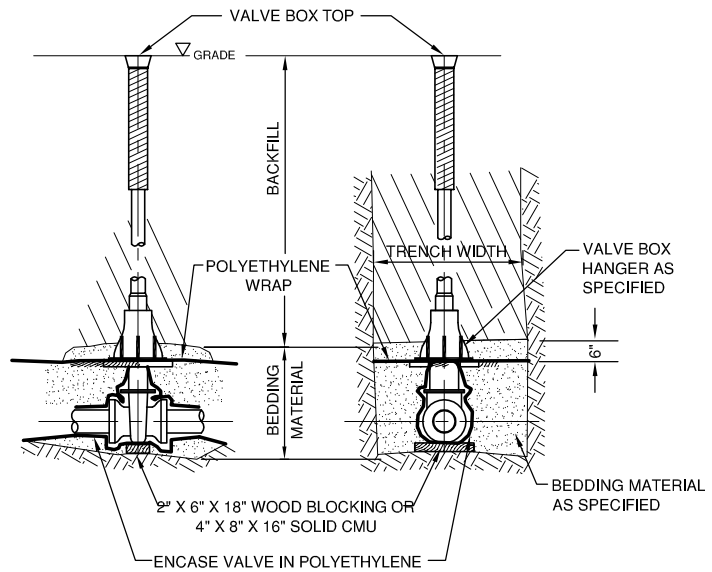
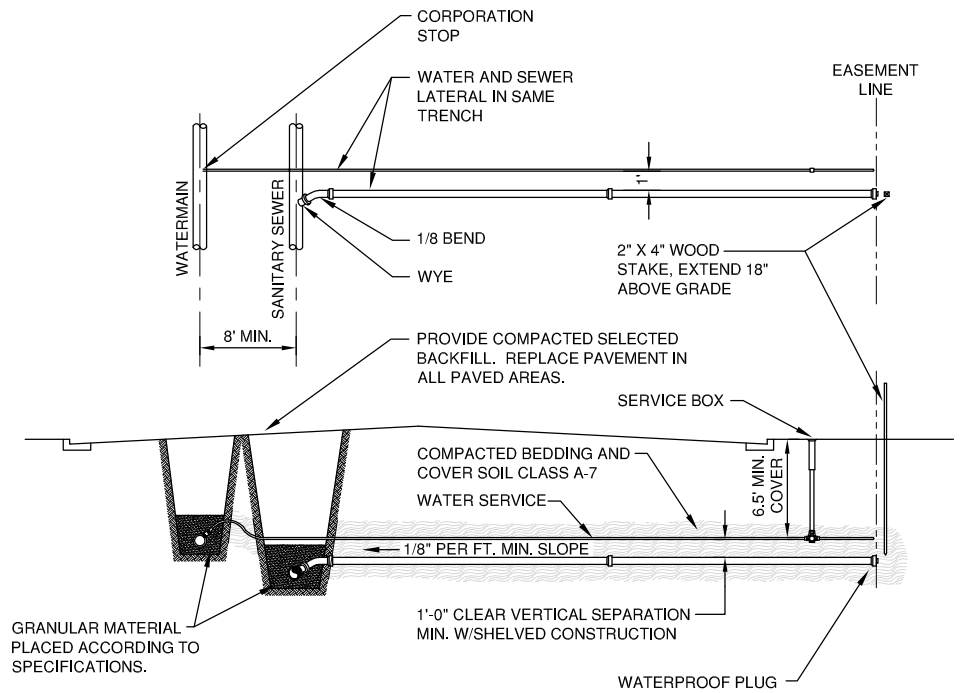
SA.	Consultant: Robert E. Lee & Associates, Inc.	CITY OF OAK CREEK, WISCONSIN		APPROVED BY
ST.				UTILITY ENGINEER DATE
W.		DESIGNED BY DATE	DRAWN BY DATE	CHECKED BY DATE
G.		D.A.M. 8/13/09	R.L.B. 8/13/09	K.A.K. 8/13/09
E.	ENGINEERING, SURVEYING, AND ENVIRONMENTAL SERVICES			APPROVED BY
T.		WATERMAIN DETAILS		CITY ENGINEER DATE
I.		IN: PUETZ ROAD BOOSTER STATION		SCALE SHEET
TS.	4664 GOLDEN POND PARK CT. HOBART, WISCONSIN 54155 PHONE: 920-662-9641 FAX: 920-662-9141 WWW.RELEEINC.COM			PLAN HOR. N.T.S. 48
PP.				PROFILE HOR. N.T.S. OF
				VER. N.T.S. 53
	REVISION BY DATE	FILE NO: 08101		200-AS-04



STANDARD HYDRANT



VALVE BOX SETTING



TYPICAL CONNECTION SEWER AND WATER

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PLAN VIEW: PLAN

SA.
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TS.
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CITY OF OAK CREEK, WISCONSIN

DESIGNED BY	DATE	DRAWN BY	DATE	CHECKED BY	DATE
D.A.M.	8/13/09	R.L.B.	8/13/09	K.A.K.	8/13/09

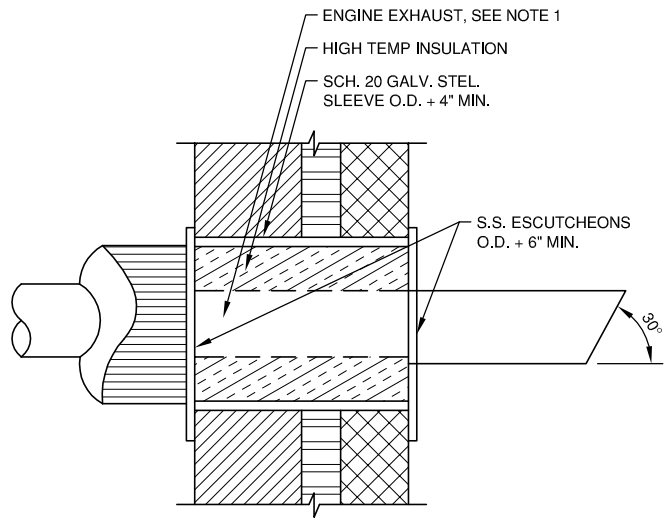
WATERMAIN DETAILS
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

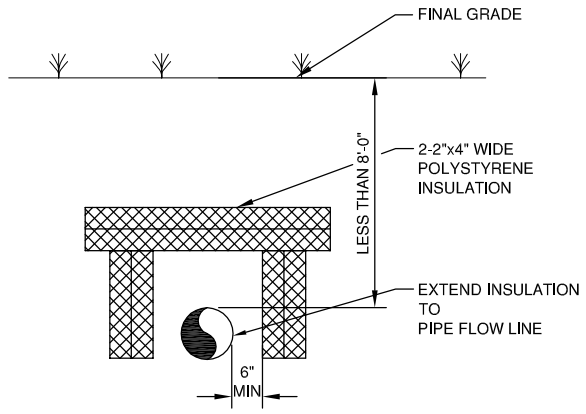
SCALE	SHEET
PLAN HOR. N.T.S.	49
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

200-M-05

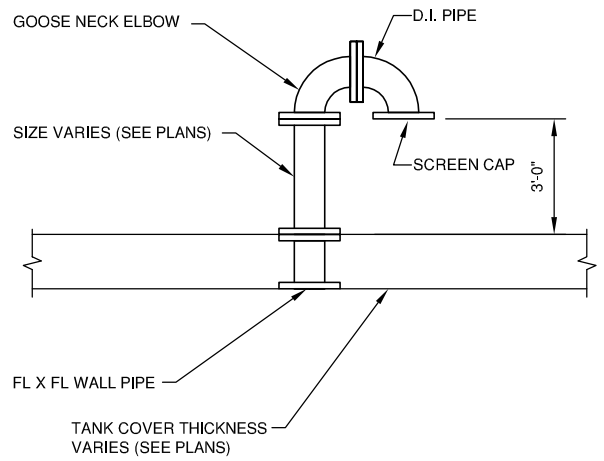


EXHAUST PIPE PENETRATION (G VAR.)

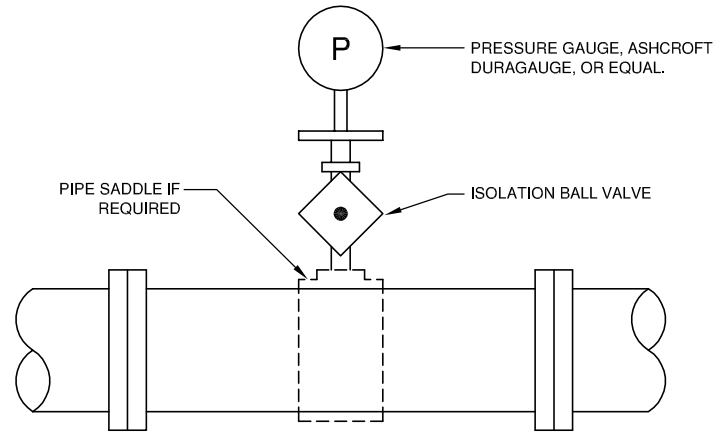
NOTE:
1. PROVIDE STAINLESS STEEL BIRD SCREEN ON ENGINE EXHAUST PIPE DISCHARGE



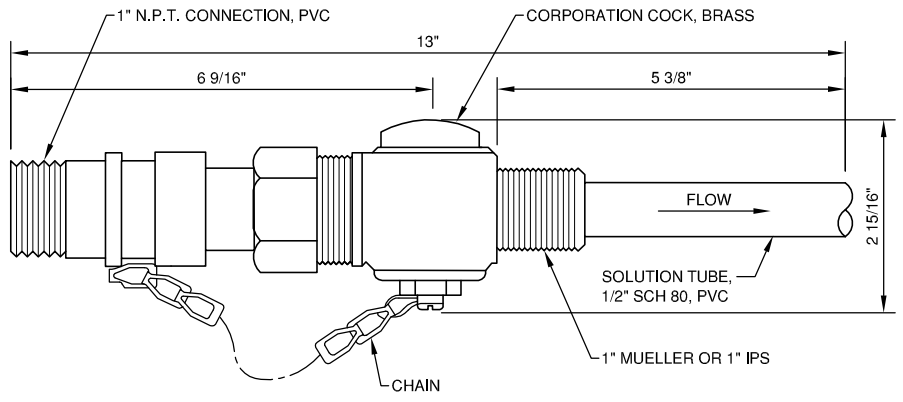
PIPE INSULATION (A VAR.)



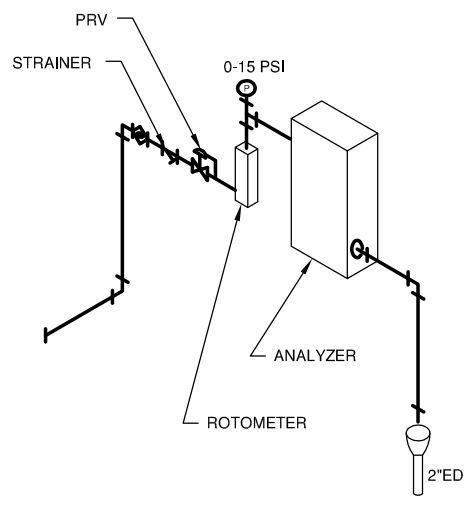
VENT PIPE DETAIL (B VAR.)



WATER SYSTEM PRESSURE GAUGE DETAIL (C VAR.)



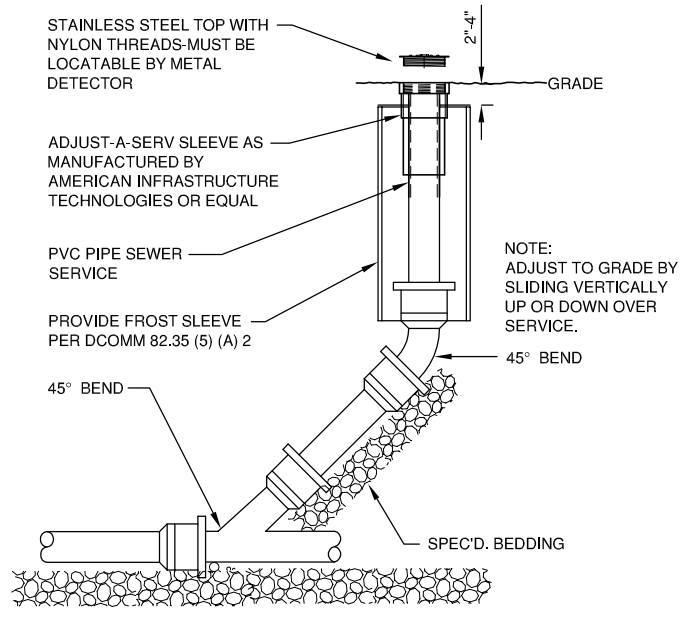
CORPORATION COCK ASSEMBLY DETAIL



CHLORINE RESIDUAL ANALYZER DETAIL (F VAR.)

NOTE:
ROTAMETER - KUBOLD VKP 4020
PRV - WATTS N223B
ANALYZER - EIT

NOTE: CLEANOUT LINE TO BE THE SAME SIZE & MATERIAL AS SEWER MAIN



CLEAN-OUT DETAIL (NON-TRAVELED AREAS) (E VAR.)

SA.
ST.
W.
G.
E.
T.
I.
TS.
PP.

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PRESSURE GAUGE DETAILS
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	50
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

200-M-06

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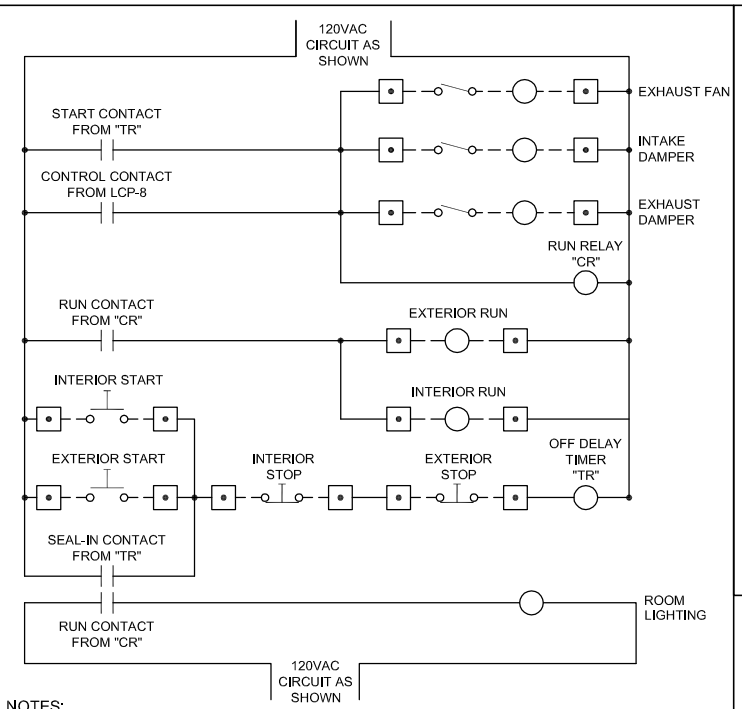
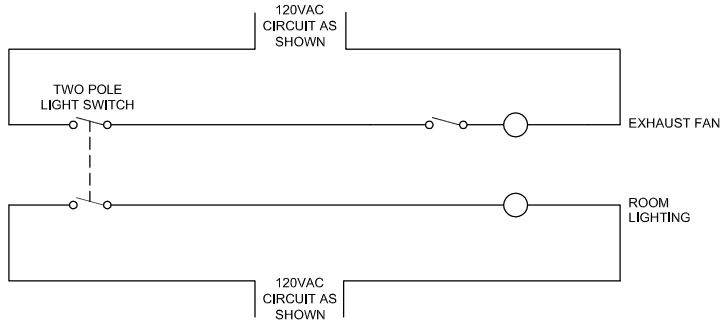
LAYOUT: LAYOUT
PLAN VIEW: PLAN



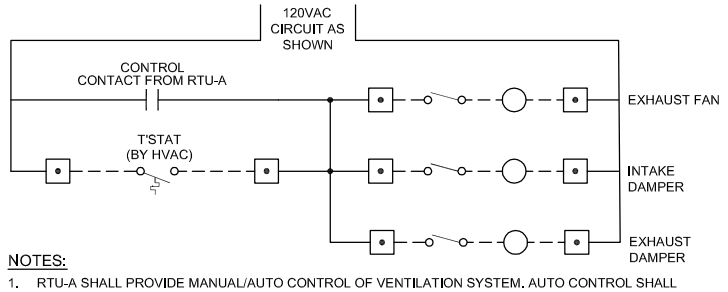
NOTES:

1. RTU-A SHALL PROVIDE MANUAL/AUTO CONTROL OF VENTILATION SYSTEM. AUTO CONTROL SHALL CONSIST OF OPERATOR ADJUSTABLE INTERVAL/DURATION TIMERS CONFIGURABLE TO OPERATE EQUIPMENT FOR AN ADJUSTABLE NUMBER OF MINUTES PER HOUR. ROOM LOW TEMPERATURE ALARM SHALL PREVENT AUTO EQUIPMENT OPERATION. GAS DETECTION ALARM AND ROOM INTRUSION CONDITION (SENSED BY DOOR SWITCH) SHALL OVER-RIDE AUTO OPERATION AND CAUSE EQUIPMENT TO OPERATE CONTINUOUSLY FOR AN OPERATOR ADJUSTABLE TIME PERIOD OR UNTIL THE GAS ALARM HAS CLEARED.
2. LOCAL INTERIOR AND EXTERIOR CONTROL STATION START-STOP SWITCHES SHALL OVER RIDE RTU-A CONTROL AND ACTIVATE VENTILATION SYSTEM WHEN INITIATED BY OPERATOR. HVAC EQUIPMENT SHALL RUN UNTIL STOP PUSHBUTTON IS ACTIVATED AR UNTIL THE ADJUSTABLE OFF DELAY TIMER HAS TIMED OUT.
3. ROOM LIGHTING AND PILOT INDICATOR LIGHTS SHALL BE INTERLOCKED WITH HVAC CONTROL AS SHOWN.
4. RTU-A PROVIDED BY OTHERS.

16000-01 CHEMICAL ROOM HVAC CONTROL
NTS



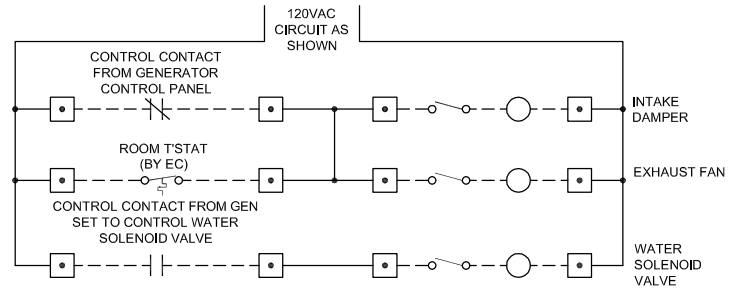
16000-02 TOILET ROOM HVAC CONTROL
NTS



NOTES:

1. RTU-A SHALL PROVIDE MANUAL/AUTO CONTROL OF VENTILATION SYSTEM. AUTO CONTROL SHALL CONSIST OF OPERATOR ADJUSTABLE INTERVAL/DURATION TIMERS CONFIGURABLE TO OPERATE EQUIPMENT FOR AN ADJUSTABLE NUMBER OF MINUTES PER HOUR. ROOM LOW TEMPERATURE ALARM SHALL OVER-RIDE AUTO OPERATION.
2. ROOM MOUNTED T'STAT SHALL OVER RIDE RTU-A CONTROL AND ACTIVATE VENTILATION SYSTEM WHEN ROOM TEMPERATURE RISES ABOVE SET POINT.
3. RTU-A PROVIDED BY OTHERS.

16000-03 PUMP ROOM HVAC CONTROL
NTS



NOTES:

1. GENERATOR CONTROL SHALL PROVIDE AUTO CONTROL OF VENTILATION SYSTEM. AUTO CONTROL SHALL CAUSE DAMPER OPERATORS TO OPEN WHEN GENERATOR ENGINE IS RUNNING. DAMPER OPERATORS SHALL BE POWER-TO-CLOSE, SPRING OPEN.
2. ROOM MOUNTED T'STAT SHALL ACTIVATE VENTILATION SYSTEM WHEN ROOM TEMPERATURE RISES ABOVE SET POINT.
3. GENERATOR CONTROL SHALL PROVIDE AUTO CONTROL OF WATER SOLENOID VALVE. CONTROL SHALL OPEN VALVE WHEN ENGINE RUNS.

16000-04 GENERATOR ROOM HVAC CONTROL
NTS

File: R:\4900\4931\031001\dwg\E7 DETAILS.dwg
Date: Aug 31, 2009 - 4:56pm
LAYOUT:
PLAN VIEW: PLAN

SA. ST. W. G. E. T. I. TS. PP.

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ELECTRICAL DETAILS
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

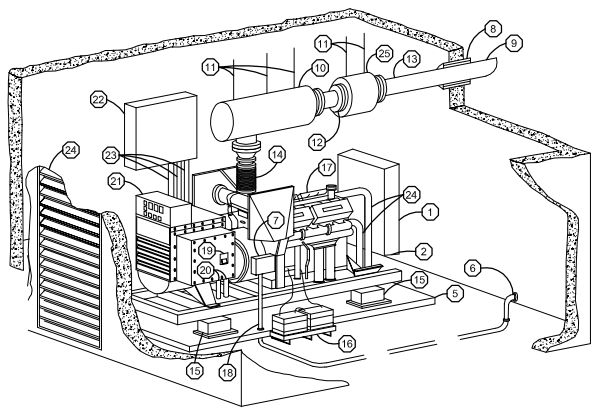
APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	51
PROFILE HOR. N.T.S. VER. N.T.S.	OF 53

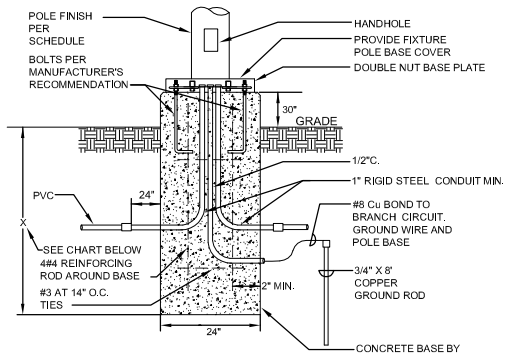
200-E-01

KEY NOTES: (X)

1. UNIT MOUNTED CITY WATER HEAT EXCHANGER.
2. SUPPLY AND DRAIN PIPING CONNECTIONS TO HEAT EXCHANGER, REFER TO PLUMBING PLANS.
3. NOT USED.
4. NOT USED.
5. CONCRETE HOUSEKEEPING PAD, SEE ARCHITECTURAL/STRUCTURAL DRAWINGS.
6. FUEL SUPPLY LINE TO GENERATOR, SIZED PER GENERATOR MANUFACTURER RECOMMENDATIONS.
7. REGULATOR FOR NATURAL GAS SUPPLY SIZED PER MFG RECOMMENDATIONS.
8. EXHAUST THIMBLE, REFER TO DETAIL (16622-17) FOR THIMBLE INSTALLATION.
9. EXHAUST PIPE WITH BIRD SCREEN, SIZED PER GENERATOR MANUFACTURER RECOMMENDATIONS.
10. EXHAUST SILENCER, MAINTAIN CLEARANCE OF 9" FROM ALL COMBUSTIBLE MATERIAL). PROVIDE MINIMUM TWO-INCH RIGID INSULATION AND 0.016" ALUMINUM JACKET, SECURED IN PLACE WITH RIVETS OR SCREWS. INSULATION AND JACKET NOT SHOWN FOR CLARITY. LOCATE AS NEAR EXHAUST OUTLET AS POSSIBLE.
11. GALVANIZED STEEL HANGER RODS, DESIGNED TO SUPPORT SILENCER, CATALYTIC CONVERTER, AND EXHAUST PIPING WEIGHT FROM CEILING. PROVIDE SUITABLE ANCHORS.
12. FLANGED CONNECTION, TYPICAL.
13. INSULATED EXHAUST PIPING SIZED PER GENERATOR MANUFACTURER RECOMMENDATIONS. SEE PLAN FOR ORIENTATION.
14. FLEXIBLE EXHAUST CONNECTOR, UNI-INSULATED.
15. SPRING TYPE VIBRATION ISOLATORS WHERE RECOMMENDED BY GENERATOR MANUFACTURER.
16. BATTERIES, CORROSION RESISTANT TRAY, AND HEAVY DUTY CABLES.
17. ENGINE-GENERATOR SET.
18. FLEXIBLE CONNECTOR ON FUEL LINE.
19. LINE CIRCUIT BREAKER.
20. CONDUITS TO TRANSFER SWITCH FOR POWER AND CONTROL. PROVIDE FLEXIBLE CONNECTORS. ROUTE ALARM WIRING TO SCADA SYSTEM THROUGH TRANSFER SWITCH. CONTROL WIRING FROM TRANSFER SWITCH TO GENERATOR CONTROL PANEL PER MANUFACTURER PROVIDED INSTALLATION DRAWINGS.
21. ENGINE GENERATOR CONTROL PANEL WITH CONTACTS FOR CONTROL OF EXHAUST SYSTEM AND FOR STATUS MONITORING.
22. AUTOMATIC TRANSFER SWITCH (SHOWN OUT OF POSITION).
23. CONDUITS FOR LINE POWER, GENERATOR POWER, OUTPUT POWER, GENERATOR CONTROL, AND CONTROL TO SCADA SYSTEM.
24. INTAKE LOUVER WITH MOTORIZED DAMPER, SPRING OPEN, POWER CLOSED. EXHAUST FAN WITH MOTORIZED DAMPER (NOT SHOWN). INTERLOCK WITH ENGINE CONTROL PANEL.
25. EXHAUST SYSTEM CATALYTIC CONVERTER, PROVIDED BY GENERATOR MANUFACTURER AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS TO MAINTAIN EXHAUST TEMPERATURE AT INLET. UNIT SHALL BE ENCLOSED AND VENTILATED, REFER TO HVAC PLANS.



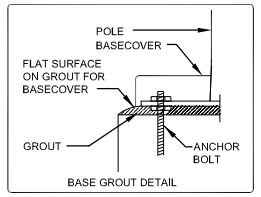
16622-15 NATURAL GAS ENGINE-GENERATOR W/ UNIT RADIATOR INSTALLATION
NTS



NOTES

1. IN UNDISTURBED EARTH, EXCLUDING FILL MATERIAL, A 2'-0" DIA. HOLE WHICH SHALL BE USED AS THE FORM FOR THE CONCRETE BASE SHALL BE DRILLED.
2. IN EXCAVATED AREAS OR IN EXISTING SOIL CONTAINING FILL OF OBJECTIONABLE MATERIAL, BACKFILL AROUND CONCRETE BASE WITH COMPACTED GRANULAR BACKFILL A MIN. OF 2'-0" IN ALL DIRECTIONS.

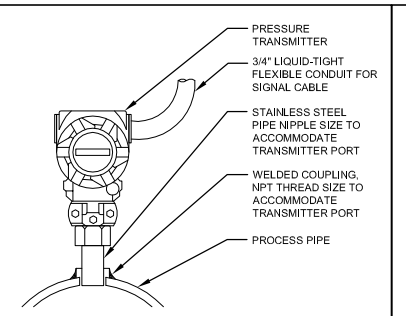
POLE HEIGHT IN FEET	BASE DEPTH IN INCHES BELOW GRADE
10'-0"	X = 60" (INCHES)
15'-0"	X = 60" (INCHES)
20'-0"	X = 60" (INCHES)
25'-0"	X = 72" (INCHES)
30'-0"	X = 72" (INCHES)
35'-0"	X = 72" (INCHES)
40'-0"	X = 96" (INCHES)
45'-0"	X = 96" (INCHES)
50'-0"	X = 108" (INCHES)



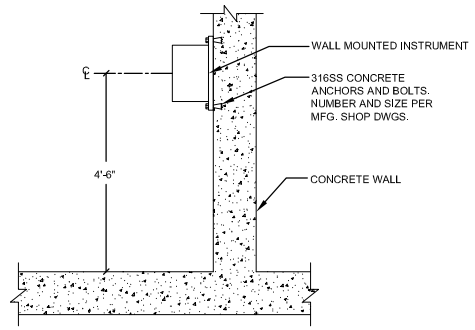
16520-10 EXTERIOR MOUNTED FIXTURE BASE DETAIL
NTS

NOTES:

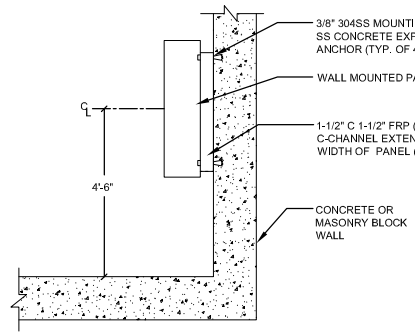
1. DIRECT-MOUNTING SUITABLE FOR POTABLE WATER OR AIR SERVICE ONLY.
2. COORDINATE PIPE FITTING REQUIREMENTS WITH MANUFACTURER.



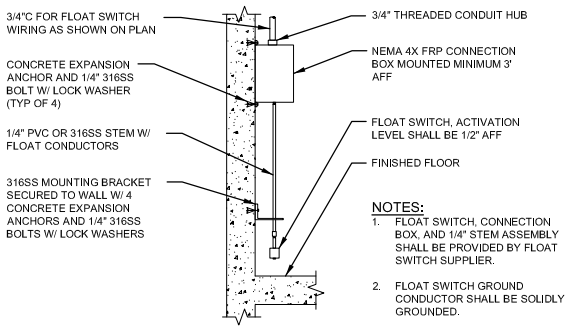
16930-51 PRESSURE TRANSMITTER DIRECT-MOUNTED INSTALLATION
NTS



16990-01 WALL-MOUNTED INSTRUMENT INSTALLATION
NTS



16980-03 WALL-MOUNTED CONTROL PANEL INSTALLATION (EXTERIOR WALL)
NTS

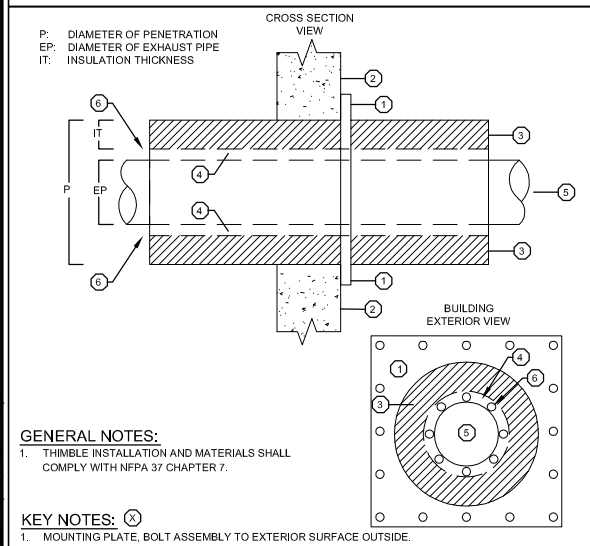


NOTES:

1. FLOAT SWITCH, CONNECTION BOX, AND 1/4" STEM ASSEMBLY SHALL BE PROVIDED BY FLOAT SWITCH SUPPLIER.
2. FLOAT SWITCH GROUND CONDUCTOR SHALL BE SOLIDLY GROUNDED.

16900-05 FLOAT SWITCH INSTALLATION DRY WELL
NTS

P: DIAMETER OF PENETRATION
EP: DIAMETER OF EXHAUST PIPE
IT: INSULATION THICKNESS



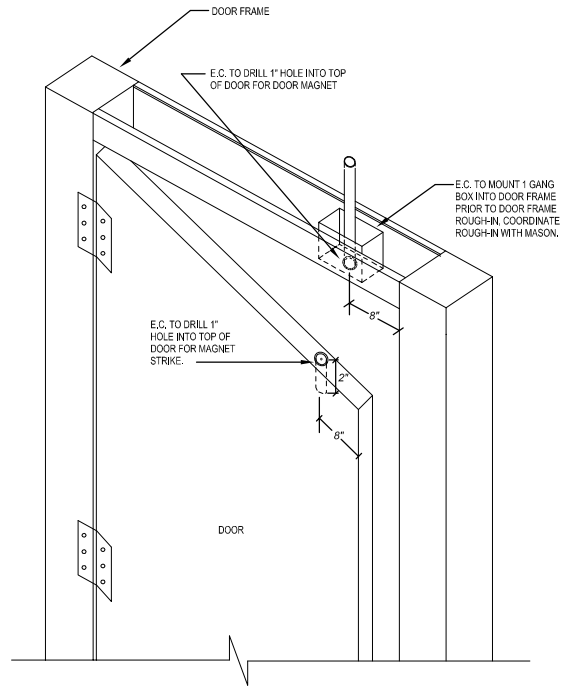
GENERAL NOTES:

1. THIMBLE INSTALLATION AND MATERIALS SHALL COMPLY WITH NFPA 37 CHAPTER 7.

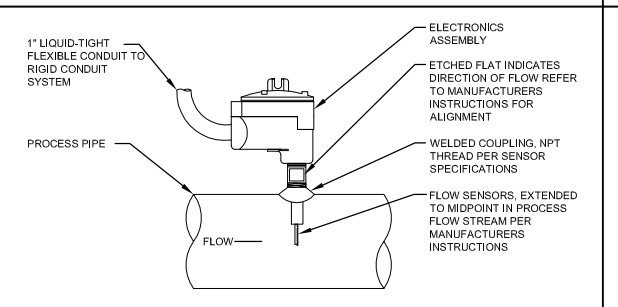
KEY NOTES: (X)

1. MOUNTING PLATE, BOLT ASSEMBLY TO EXTERIOR SURFACE OUTSIDE.
2. EXTERIOR SURFACE. FRAME & GROUT AS REQ'D TO PREPARE FOR MOUNTING PLATE INSTALLATION.
3. HIGH TEMPERATURE INSULATION. REFER TO GENERATOR MANUFACTURER'S DATA FOR EXHAUST TEMPERATURE INFORMATION AND TO NFPA 37 CHAPTER 7 FOR INSULATION REQUIREMENTS.
4. HEAT DISSIPATION CHAMBER.
5. EXHAUST PIPE. MINIMUM DIAMETER PER GENSET MANUFACTURER'S REQUIREMENTS. INSTALL SPACERS AS REQUIRED TO CENTER EXHAUST PIPE WITHIN THIMBLE.
6. HEAT DISSIPATION VENT OPENINGS (INTERIOR SIDE OF THIMBLE ONLY.)

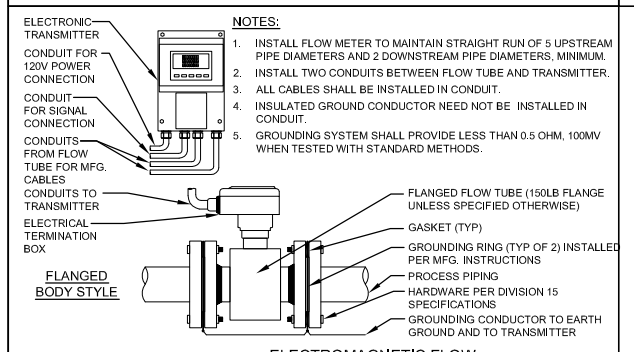
16622-17 STANDBY GENERATOR EXHAUST PIPE SURFACE PENETRATION (EXHAUST THIMBLE)
NTS



16708-01 INTRUSION ALARM DOOR SWITCH
NTS



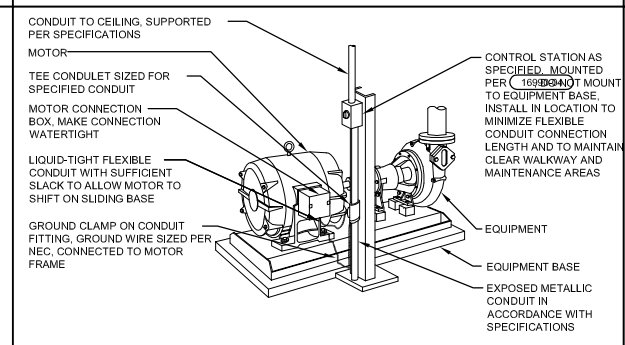
16910-01 THERMAL DISPERSION FLOW SWITCH INSTALLATION
NTS



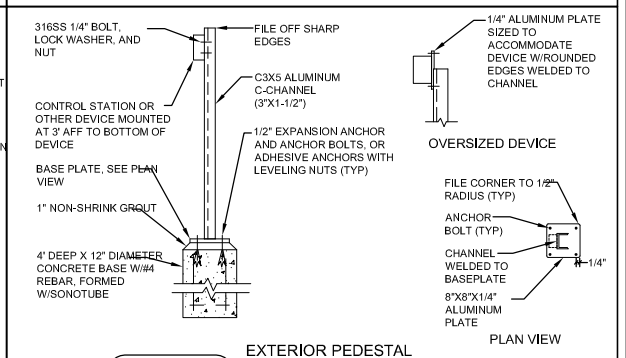
NOTES:

1. INSTALL FLOW METER TO MAINTAIN STRAIGHT RUN OF 5 UPSTREAM PIPE DIAMETERS AND 2 DOWNSTREAM PIPE DIAMETERS, MINIMUM.
2. INSTALL TWO CONDUITS BETWEEN FLOW TUBE AND TRANSMITTER.
3. ALL CABLES SHALL BE INSTALLED IN CONDUIT.
4. INSULATED GROUND CONDUCTOR NEED NOT BE INSTALLED IN CONDUIT.
5. GROUNDING SYSTEM SHALL PROVIDE LESS THAN 0.5 OHM, 100MV WHEN TESTED WITH STANDARD METHODS.

16910-51 ELECTROMAGNETIC FLOW METER INSTALLATION
NTS



16111-03 EQUIPMENT CONNECTION WITH EXPOSED CONDUIT
NTS



16990-04 EXTERIOR PEDESTAL MOUNTED DEVICE
NTS

SA.	
ST.	
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CITY ENGINEER DATE

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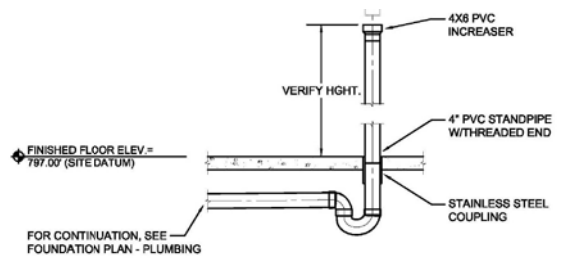
PLAN HOR. N.T.S.	52
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

200-E-02

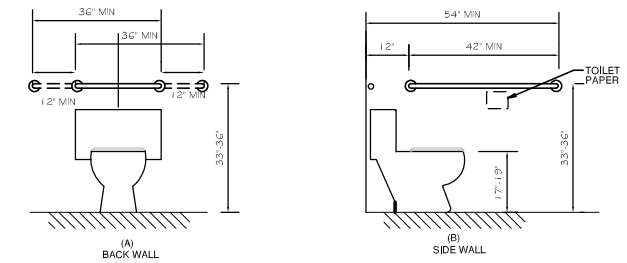
File: R:\4900\4931\4931001\dwg\CE DETAILS.dwg
LAYOUT: LAYOUT
PLAN VIEW: PLAN

CLEANOUT SCHEDULE						
TYPE	BODY MATERIAL	PLUG MATERIAL	TOP MATERIAL	OPTIONS	MFGR.	SERIES NUMBER
YCO	C.I.	BRASS	---	---	J.R. SMITH	FIG. NO. 4250-U
CO	C.I./P.V.C.	BRASS	---	---	---	---
FCO	C.I.	BRASS	N.B.	---	J.R. SMITH	FIG. NO. 4250-U

FLOOR DRAIN SCHEDULE							
TYPE	SIZE	BODY MATERIAL	TOP MATERIAL	STRAINER DIAMETER	FLASHING CLAMP	MFGR.	SERIES NUMBER
FD-1	0'-3"	C.I.	N.B.	6" DIAM.	NO	J.R. SMITH	FIG. NO. 2010A



STAND PIPE DETAIL
SCALE: 1/2" = 1'-0"



GRAB BARS AT WATER CLOSETS

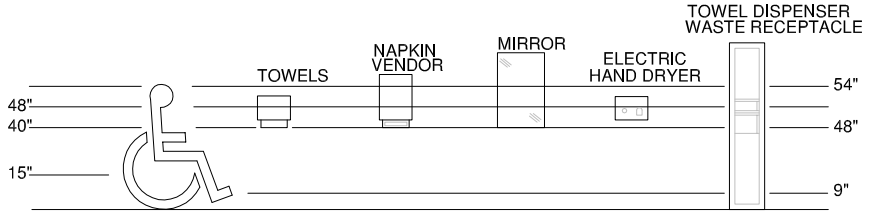
GENERAL NOTES

1. DO NOT SCALE DRAWING. INSTALL THE FIXTURES TO THE ROUGHING-IN DIMENSIONS SHOWN ON THE ARCHITECTURAL PLANS. IF DIMENSIONS ARE IN QUESTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING CLARIFICATION BEFORE CONTINUING WITH CONSTRUCTION. ALL LOCATIONS ARE APPROXIMATE AND SHOULD BE FIELD VERIFIED. COORDINATE WITH OWNER AND FIELD ENGINEER.
2. THE CONTRACTOR SHALL VERIFY ACTUAL PIPING LENGTHS AND SIZES.
3. ALL PIPES, FITTINGS, AND CONNECTIONS SHALL BE WATER TIGHT.
4. CONTRACTOR SHALL REVIEW ENTIRE PLANS AND SPECIFICATION FOR ADDITIONAL INFORMATION AND DETAILS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL REQUIREMENTS REQUIRED HEREIN.
5. CONTRACTORS SHALL BE QUALIFIED PROFESSIONALS. ALL WORK SHALL BE INSTALLED IN A WORKMANLIKE MANNER. ALL WORK SHALL COMPLY WITH ALL RELEVANT CODES, REGULATIONS, AND GUIDANCES.
6. CONTRACTOR SHALL COORDINATE INSTALLATION OF ALL PIPING, FIXTURES, AND EQUIPMENT WITH ALL DISCIPLINES TO ELIMINATE CONFLICTS. DO NOT INSTALL ANY PIPING OR DEVICES ABOVE ELECTRICAL PANELS.
7. ALL PENETRATIONS SHALL BE SUPPORTED, SEALED, AND FIRESTOPPED TO MATCH THE ORIGINAL FIRE RATING OF THE STRUCTURE PENETRATED.
8. PLUMBING CONTRACTOR SHALL COORDINATE THE LOCATION OF ALL WATER DISTRIBUTION PIPING IN THE CEILINGS WITH THE ELECTRICAL LIGHT FIXTURES AND HVAC DUCT WORK AND PIPING.
9. PLUMBING CONTRACTOR SHALL COORDINATE THE LOCATIONS OF ALL FLOOR DRAINS AND SIGHT DRAINS IN MECHANICAL ROOMS WITH THE MECHANICAL CONTRACTOR.

ACCESSIBLITY GUIDELINES

THE DIAGRAM BELOW SHOWS RECOMMENDED MOUNTING HEIGHTS FOR MANY WASHROOM ACCESSORIES. A MINIMUM 30" x 48" CLEAR FLOOR SPACE IS REQUIRED IN FRONT OF ALL ACCESSIBLE FIXTURES AND ACCESSORIES.

FORWARD APPROACH



QUICK REFERENCE GUIDELINES
(BE SURE TO REFERNCE WITH ADA CODE)

SA. ST. W. G. E. T. I. TS. PP.

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REVISION BY DATE

CITY OF OAK CREEK, WISCONSIN

DESIGNED BY	DATE	DRAWN BY	DATE	CHECKED BY	DATE
D.A.M.	8/13/09	R.L.B.	8/13/09	K.A.K.	8/13/09

PLUMBING SCHEDULE & DETAILS
IN: PUETZ ROAD BOOSTER STATION

FILE NO: 08101

APPROVED BY
UTILITY ENGINEER DATE
APPROVED BY
CITY ENGINEER DATE

SCALE	SHEET
PLAN HOR. N.T.S.	53
PROFILE HOR. N.T.S.	OF
VER. N.T.S.	53

200-P-01

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Plot date: Sep 01, 2009 - 3:30pm
LAYOUT: LAYOUT
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