FOR CONSTRUCTION

#12

CONTRACT DOCUMENTS AND SPECIFICATIONS

FOR

WASTEWATER TREATMENT PLANT

FOR THE CITY OF PITTSFIELD
PIKE COUNTY, ILLINOIS

CONTRACT FOR:

MECO PROJECT NO. 610-064

AUGUST, 2014

MAY 06 2015

MECO ENGINEERING CO., INC.
ENGINEERING • SURVEYING • STRUCTURAL • ELECTRICAL • MECHANICAL
OFFICES LOCATED IN:
HANNIBAL, MO • JEFFERSON CITY, MO
BOONVILLE, MO • PITTSFIELD, IL
www.mecoengineering.com
MO Engineering Lic. #000898 - IL Design Firm #184-001749

CONTRACT DOCUMENTS AND SPECIFICATIONS

FOR

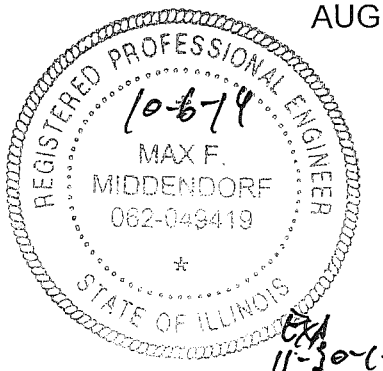
WASTEWATER TREATMENT PLANT

FOR THE CITY OF PITTSFIELD
PIKE COUNTY, ILLINOIS

CONTRACT FOR:

MECO PROJECT NO. 610-064

AUGUST, 2014



I HEREBY CERTIFY THAT THESE SPECIFICATIONS WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION, AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER EXISTING UNDER THE LAWS OF THE STATE OF ILLINOIS:

MAX F. MIDDENDORF, P.E. # 062-049419

MECO ENGINEERING CO., INC.

ENGINEERING • SURVEYING • STRUCTURAL • ELECTRICAL • MECHANICAL

OFFICES LOCATED IN:
HANNIBAL, MO • JEFFERSON CITY, MO
BOONVILLE, MO • PITTSFIELD, IL

www.mecoengineering.com

MO Engineering Lic. #000898 - IL Design Firm #184-001749

SECTION 00010
TABLE OF CONTENTS

IEPA (WPCLP) DOCUMENTATION

ADVERTISEMENT FOR BIDS ..... PAGES 1 -2 OF 64
INFORMATION FOR BIDDERS ..... PAGES 3-5 OF 64
BID FORM OR PROPOSAL ..... PAGES 6-17 OF 64
BID BOND ..... PAGES 18-19 OF 64
AGREEMENT ..... PAGES 20-22 OF 64
PERFORMANCE BOND ..... PAGES 23-24 OF 64
PAYMENT BOND ..... PAGES 25-26 OF 64
NOTICE OF INTENT TO AWARD ..... PAGES 27 OF 64
NOTICE OF AWARD ..... PAGES 28 OF 64
NOTICE TO PROCEED ..... PAGES 29 OF 64
CHANGE ORDER ..... PAGES 30 OF 64
NOTICE OF REQUIREMENTS FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY ..... PAGES 31-41 OF 64
U.S. ENVIRONMENTAL PROTECTION AGENCY – CERTIFICATION OF NONSEGREGATED FACILITIES ..... PAGES 42 OF 64
NOTICE TO LABOR UNIONS OR OTHER ORGANIZATIONS OF WORKERS NONDISCRIMATION IN EMPLOYMENT ..... PAGES 43 OF 64
CERTIFICATION REGARDING DEBARMENT, SUSPENSION AND OTHER RESPONSIBILITY MATTERS ..... PAGES 44-45 OF 64
CONSTRUCTION CONTRACTS OF LOAN RECIPIENT AND OTHER SECTIONS FROM "PROCEDURES FOR ISSUING LOANS FROM THE WATER POLLUTION CONTROL LOAN PROGRAM" ..... PAGES 46-48 OF 64
BIDDER CERTIFICATION IN COMPLIANCE WITH ARTICLE 33E TO THE "CRIMINAL CODE OF 1961" ..... PAGES 49 OF 64
SPECIFICATION FOR DISADVANCED BUSINESS ENTERPRISE PARTICIPATION ..... PAGES 50-61 OF 64
NONDISCRIMINATION CLAUSE ..... PAGE 62 OF 64
BIDDER CERTIFICATION REGARDING THE USE OF AMERICAN IRON AND STEEL PRODUCTS ..... PAGES 63-64 OF 64

OTHER MISCELLANEOUS DOCUMENTATION

00451 CONTRACTOR QUALIFICATIONS 00451/1-6
00621 PAY ESTIMATE COVER 00621/1
00700 GENERAL CONDITIONS 00700/1-14
00800 SPECIAL CONDITIONS 00800/1-4

00805 SPECIFIC PROJECT REQUIREMENTS 00805/1-3

FEDERAL PREVAILING WAGES ..... PINK SHEETS

DIVISION 1 - GENERAL REQUIREMENTS

01110 SUMMARY OF WORK 01110/1-10

01270 UNIT PRICES 01270/1-5

01450 QUALITY CONTROL 01450/1-2

DIVISION 2 - SITE CONSTRUCTION

02080 UTILITY MATERIALS 02080/1-10

02230 SITE CLEARING 02230/1-2

02280 UTILITY RELOCATION AND ADJUSTMENTS 02280/1-1

02315 EXCAVATING, FILLING AND GRADING 02315/1-13

02316 P.C.C. FLOWABLE FILL 02316/1-2

02343 GEOTEXTILE SEPARATION FABRIC 02343/1-5

02373 SEDIMENTATION AND EROSION CONTROL 02373/1-2

02374 FERTILIZING, SEEDING, AND MULCHING 02374/1-4

02377 EMBANKMENT PROTECTION 02377/1-1

02510 WATER DISTRIBUTION 02510/1-7

02536 SANITARY SEWER MANHOLES, FRAMES AND COVERS 02536/1-4

02537 GRAVITY SEWAGE COLLECTION LINES 02537/1-7

02538 SEWAGE FORCE MAINS 02538/1-5

02722 AGGREGATE BASE COURSE/AGGREGATE SURFACE COURSE 02722/1-1

02744 CHIP SEAL 02744/1-1

02775 WALKS AND CURBS 02775/1-1

02821 CHAIN LINK FENCING 02821/1-5

DIVISION 3 - CONCRETE

03050 PORTLAND CEMENT CONCRETE 03050/1-8

DIVISION 4 – MASONRY

04050 BASIC MASONRY MATERIALS AND METHODS 04050/1-2

DIVISION 5 – METALS

05060 MISCELLANEOUS METALS 05060/1-3

05520 HANDRAILS AND RAILINGS 05520/1-2

05530 GRATING AND FIBERGLASS INSULATION PANELS 05530/1-3

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

07111 BITUMINOUS DAMP PROOFING 07111/1-1

DIVISION 9 – FINISHES

09511 SUSPENEDED ACOUSTICAL CEILINGS 09511/1-3

09900 PAINTS AND COATINGS 09900/1-9

DIVISION 10 – SPECIALITIES

10441 FIRE EXTINGUISHERS 10441/1-2

DIVISION 11 – EQUIPMENT

11286 SLIDGE GATES 11286/1-1

11322 INCLINED GRIT SCREW 11322/1-4

11332 AUTOMATIC COURSE BAR SCREEN ..... Section 11332 Revised per Add # 1 ..... 11332/1-7

11850 INFLUENT LIFT STATION REHABILITATION ..... Section 11850 Revised per Add # 1 ..... 11850/1-9

DIVISION 13 – SPECIAL CONSTRUCTION

13270 ENERGY EFFICIENT TRANSFORMERS 13270/1-3

13410 ELECTROMAGNETIC FLOW METER ..... a. Section 13410 shall be deleted. Refer to Section 13910, 2.01 , for meter specifications. 13410/1-4

13442 PANELBOARDS 13442/1-7

13443 MOTOR CONTROL CENTER 13443/1-22

13476 SURGE PROTECTION FOR LOW VOLTAGE ELECTRICAL POWER CIRCUITS 13476/1-7

13900 CONTROL SYSTEM INTEGRATION 13900/1-3

13910 INSTRUMENTATION 13910/1-7

13920 CONTROL PANELS 13920/1-16

13930 PROGRAMMABLE LOGIC CONTROLLERS 13930/1-15

13940 SUPERVISORY CONTROL SYSTEM 13940/1-12

DIVISION 16 – ELECTRICAL

16010 GENERAL ELECTRICAL REQUIREMENTS 16010/1-4

16050 BASIC ELECTRICAL MATERIALS AND METHODS 16050/1-6

16060 GROUNDING AND BONDING 16060/1-3

16120 CONDUCTORS AND CABLES 16120/1-3

16130 RACEWAYS AND BOXES 16130/1-5

16220 CLARIFIER DRIVES 16220/1-3

16410 ENCLOSED SWITCHES AND CIRCUIT BREAKERS 16410/1-4

16510 LIGHTING 16510/1-3

ADVERTISEMENT FOR BIDS

City of Pittsfield
Owner
215 N. Monroe Street
Address
Pittsfield, IL 62363

Separate sealed BIDS for the construction of:

Wastewater Treatment Plant Improvements for the City of Pittsfield, Pike County, Illinois incorporating Sitework; Headworks Construction; Piping; Clarifier Drive Replacement and Bridge Repainting; Air Header Rehab / Main Air Header Replacements; Electrical/SCADA/MCC Controls; Teritiary Filter; Building Renovation and Remodeling; Demolition of Headworks; and all items necessary for total completion of project.

will be received by: City of Pittsfield, Illinois

at the office of: City of Pittsfield, Illinois

until: 10:00 a.m., June 30, 2015, and then at said office publicly opened and read aloud.

"Any contract or contracts awarded under this invitation for bids are expected to be funded in part by a loan from the Illinois Environmental Protection Agency (Illinois EPA). Neither the State of Illinois nor any of its departments, agencies, or employees is or will be a party to this invitation for bids or any resulting contract. The procurement will be subject to regulations contained in the Procedures for Issuing Loans from the Water Pollution Control Loan Program (35 IAC Part 365), the Davis-Bacon Act (40 USC 276a through 276a-5) as defined by the United States Department of Labor, the Employment of Illinois Workers on Public Works Act (30 ILCS 570), and the "Use of American Iron and Steel" requirements as contained in Section 436 of H.R. 3547, The Consolidated Appropriations Act, 2014. This procurement is also subject to the loan recipient's policy regarding the increased use of disadvantaged business enterprises. The loan recipient's policy requires all bidders to undertake specified affirmative efforts at least sixteen (16) days prior to bid opening. The policy is contained in the specifications. Bidders are also required to comply with the President's Executive Order No. 11246, as amended. The requirements for bidders and contractors under this order are explained in 41 CFR 60-4."

The CONTRACT DOCUMENTS may be examined at the following locations:

City of Pittsfield, 215 N. Monroe Street, Pittsfield, IL 62363

MECO Engineering Company, Inc., 3120 Palmyra Road, Hannibal, MO 63401

MECO Engineering Company, Inc., 1301 E. Washington, Pittsfield, IL 62363

Southern Illinois Builders Association, 1468 Green Mount Road, O'Fallon, IL 62269

Greater Peoria Contractors & Suppliers Association, 1811 West Altorfer Drive, Peoria, IL 61615

ISQFT Plan Room, 420 West Huron, Chicago, IL 60654

Copies of the CONTRACT DOCUMENTS may be obtained at the Office of: MECO Engineering Company, Inc. located at: 3120 Palmyra Road, Hannibal, MO 63401 upon payment of $250.00 for each set.

APRIL 29, 2015	JOHN HAYDEN, MAYOR
DATE	SIGNATURE

INFORMATION FOR BIDDERS

BIDS will be received by the City of Pittsfield, Illinois

(herein called the "OWNER"), at 215 N. Monroe Street, Pittsfield, IL 62363

until June 30, 2015 at 10:00 a.m., and then at said office publicly opened and read aloud.

Each BID must be submitted in a sealed envelope, addressed to the City of Pittsfield, Illinois at 215 N. Monroe Street, Pittsfield, IL 62363. Each sealed envelope containing a BID must be plainly marked on the outside as BID for the Wastewater Treatment Plant and the envelope should bear on the outside the name of the BIDDER, his/her address, his/her license number if applicable and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the OWNER at 215 N. Monroe Street, Pittsfield, IL 62363.

All BIDS must be made on the required BID form. All blank spaces for BID prices must be filled in, in ink or typewritten, and the BID form must be fully completed and executed when submitted. Only one copy of the BID form is required.

Any BID may be modified or withdrawn prior to the above scheduled time for the opening of BIDS or authorized postponement thereof. Any BID received after the time and date specified shall not be considered. No BIDDER may withdraw a BID within 60 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves of the accuracy of the estimated quantities in the BID Schedule by examination of the site and a review of the drawings and specifications including ADDENDA. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the WORK to be done.

The OWNER shall provide to BIDDERS prior to BIDDING, all information that is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be acquired.

The CONTRACT DOCUMENTS contain the provisions required for the construction of the PROJECT. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve him from fulfilling any of the conditions of the contract.

A BID bond payable to the OWNER must accompany each BID for five percent of the total amount of the BID. As soon as the BID prices have been compared, the OWNER will return the BONDS of all except the three lowest responsible BIDDERS. When the Agreement is executed the bonds of the two remaining unsuccessful BIDDERS will be returned. The BID BOND of the successful BIDDER will be retained until the payment BOND and performance BOND have been executed and approved, after which it will be returned. A certified check may be used in lieu of a BID BOND.

A performance BOND and a payment BOND, each in the amount of 100 percent of the CONTRACT PRICE, with a corporate surety approved by the OWNER, will be required for the faithful performance of the contract.

Attorneys-in-fact who sign BID BONDS or payment BONDS and performance BONDS must file with each BOND a certified and effective dated copy of their power of attorney.

Any contract entered into by the loan recipient and any sub-agreement hereunder, shall provide that representatives of the Agency will have access to the work whenever it is in preparation or progress and that the contractor or subcontractor will provide proper facilities for such access and inspection. Such contract or sub-agreement must also provide that the Agency or any authorized representative shall have

access to any books, documents, papers, and records of the contractor or subcontractor, which are pertinent to the project for the purpose of making audit, examination, excerpts, and transcriptions thereof.

The party to whom the contract is awarded will be required to execute the Agreement and obtain the performance BOND and payment BOND within ten (10) calendar days from the date when NOTICE OF AWARD is delivered to the BIDDER. The necessary Agreement and BOND forms shall accompany the NOTICE OF AWARD. In case of failure of the BIDDER to execute the Agreement, the OWNER may at his option consider the BIDDER in default, in which case the BID BOND accompanying the proposal shall become the property of the OWNER.

The OWNER within ten (10) days of receipt of acceptable performance BOND, payment BOND and Agreement signed by the party to whom the Agreement was awarded shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the OWNER not execute the Agreement within such period, the BIDDER may by WRITTEN NOTICE withdraw his signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the OWNER.

The OWNER shall issue the NOTICE TO PROCEED within ten (10) days of the execution of the Agreement. Should there be reasons why the NOTICE TO PROCEED cannot be issued within such period, the time may be extended by mutual agreement between the OWNER and CONTRACTOR. If the NOTICE TO PROCEED has not been issued within the ten (10) day period or within the period mutually agreed upon, the CONTRACTOR might terminate the Agreement without further liability on the part of either party.

The OWNER may make such investigations as he deems necessary to determine the ability of the BIDDER to perform the WORK, and the BIDDER shall furnish to the OWNER all such information and data for this purpose as the OWNER may request. The OWNER reserves the right to reject any BID if the evidence submitted by, or investigation of, such BIDDER fails to satisfy the OWNER that such BIDDER is properly qualified to carry out the obligations of the Agreement and to complete the WORK contemplated therein.

A conditional or qualified BID will not be accepted.

Award will be made to the low, responsive, responsible BIDDER.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the PROJECT shall apply to the contract throughout including the Employment of Illinois Workers on Public Works Act (30 ILCS 570) and the Davis-Bacon Wage Act (40 USC 276a through 276a-5) as defined by the United States Department of Labor.

All BIDDERS will comply with Sec. 436 of H.R. 3547, "The Consolidated Appropriations Act, 2014", which specifies that all "iron and steel products" used in the project are produced in the United States.

BIDDER shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The contractor shall carry out applicable requirements of 40 CFR Part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. Failure by the contractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to do any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to his BID.

Each BIDDER shall supply a list of all subcontractors that submitted proposals and if requested by the OWNER all major material suppliers.

Inspection trips for prospective BIDDERS will leave from the office of the City of Pittsfield, Illinois. at 215 N. Monroe Street, Pittsfield, IL 62363.

The ENGINEER is Max F. Middendorf, P.E. with MECO Engineering Company, Inc. His address is 3120 Palmyra Road, Hannibal, MO 63401 and 1301 E. Washington, Pittsfield, IL 62363.

BID FORM OR PROPOSAL

Proposal of _____ (hereinafter called "BIDDER"), organized and existing under the laws of the State of _____ doing business as _____ *
to the City of Pittsfield, Illinois (hereinafter called "OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK for the construction of the Wastewater Treatment Plant in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE TO PROCEED and to fully complete the PROJECT within 365 consecutive calendar days thereafter. BIDDER further agrees to pay as liquidated damages, the sum of $800.00 for each consecutive calendar day thereafter.

BIDDER certifies that all iron and steel products used in the project for the construction, alteration, maintenance, or repair of a public water system are produced in the United States in compliance with Section 436. (a) – (f) of H. R. 3547, "The Consolidated Appropriation Act, 2014".

* **Insert "a corporation", "a partnership", or "an individual" as applicable.**

(I) By submission of the bid, each bidder certifies, and in the case of a joint bid each party thereto certifies as to his own organization, that in connection with the bid:

(i) The prices in the bid have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;

(ii) Unless otherwise required by law, the prices which have been quoted in the bid have not knowingly been disclosed by the bidder, prior to opening, directly or indirectly to any other bidder or to any competitor; and

(iii) No attempt has been made or will be made by the bidder to induce any other person or firm to submit or not to submit a bid for the purpose of restricting competition.

(II) Each person signing the bid shall certify that:

(i) He is the person in the bidder's organization responsible within that organization for the decision as to the prices being bid and that he has not participated, and will not participate, in any action contrary to (I) (i) through (I)(iii) above; or

(ii) He is not the person in the bidder's organization responsible within that organization for the decision as to the prices being bid but that he has been authorized to act as agent for the persons responsible for such decision in certifying that such persons have not participated, and will not participate, in any action contrary to (I)(i) through (I)(iii) above, and as their agent shall so certify; and shall also certify that he has not participated, and will not participate, in any action contrary to (I)(i) through (I)(iii) above.

BIDDER acknowledges receipt of the following ADDENDUM (where applicable):

_____

_____

_____

BIDDER certifies that wages paid in connection with the PROJECT shall be paid at prevailing rates not less than those prevailing under the Davis-Bacon Wage Act. Bidder further certifies that the provisions contained in the following clauses will be exercised in the performance of any contract resulting from this BID and are made a part of the CONTRACT DOCUMENTS thereto by their inclusion in the BID as follows:

"(1) Minimum wages.

(i) All laborers and mechanics employed or working upon the site of the work 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 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 costs reasonably 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 paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less 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 of work actually performed, without regard to skill, except as provided in § 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 paragraph (a)1(ii) of this section) and the Davis-Bacon poster (WH-1321) 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.

Subrecipients may obtain wage determinations from the U.S. Department of Labor's web site, www.wdol.gov.

(ii)(A) The subrecipient, on behalf of USEPA, shall require that any class of laborers or mechanics, including helpers, 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. The USEPA award official 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 performed by 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 benefits, 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 the subrecipient 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 the subrecipient to IEPA. IEPA will transmit the report, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify or disapprove every additional classification action within 30 days of receipt and so advise IEPA or will notify IEPA within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the subrecipient do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the questions, including the views of all interested parties and the recommendation of the award official, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, 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 costs 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.

(2) Withholding, the subrecipient shall upon written request of the USEPA Award Official or 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, all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such actions as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, 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 commitment 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.

(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the subrecipient, that is, the entity that receives the sub-grant or loan from IEPA. Such documentation shall be available on request of IEPA or USEPA. As to each payroll copy received, the subrecipient shall provide written confirmation in a form satisfactory to IEPA indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). Form WH-347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the subrecipient for transmission to IEPA or USEPA, if requested by USEPA, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the subrecipient.

(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 provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR Part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR Part 5, and that such information is correct and complete.

(2) That each laborer and 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 forth in Regulations, 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 properly 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 the 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 authorized representatives of IEPA, USEPA 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, the Federal agency or IEPA 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 5.12.

(4) Apprentices and trainees –

(i) Apprentices. Apprentices will be permitted to work at less than 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, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, 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 Office of Apprenticeship Training, Employer and Labor Services 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 Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, 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 on 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 classification of 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 the 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 requirements. 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 shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the USEPA determines may be appropriate, 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 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 subrecipients, IEPA, USEPA, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

(i) 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).

(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).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

4. Contract Provision for Contracts in Excess of $100,000

(a) Contract Work Hours and Safety Standards Act. The subrecipient shall insert the following clauses set forth in paragraphs (a)(1), (2), (3), and (4) of the section in full in any contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Item 3, above or 29 CFF 4.6. 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 forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefore 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 watchmen and guards, employed in violation of the clauses set forth in paragraph (b)(1) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The subrecipient, upon written request of the USEPA Award Official or an authorized representative of the Department of Labor, shall withhold or cause to be withheld, form 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 contractor, or any other federally-assisted contract su7bject 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 paragraph (b)(2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section 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 paragraphs (b)(1) through (4) of this section.

(b) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Subrecipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Subrecipient shall insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the IEPA, USEPA and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

5. Compliance Verification

(a) The subrecipient shall periodically interview a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that contractors or subcontractors are paying the appropriate wage rates. As provided in 29 CFR 5.6(a)(6), all interviews must be conducted in confidence. The subrecipient must use Standard Form 1445 or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from USEPA on request.

(b) The subrecipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, the subrecipient must conduct interviews with a representative group of covered employees within two weeks of each contractor or subcontractor's submission of its initial weekly payroll data and two weeks prior to the estimated completion date for the contract or subcontract. Subrecipients must conduct more frequent interviews if the initial interviews or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. Subrecipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

(c) The subrecipient shall periodically conduct spot checks of a representative sample of weekly payroll data to verify that contractors and subcontractors are paying the appropriate wage rates. The subrecipient shall establish and follow a spot check schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, the subrecipient must spot check payroll data within two weeks of each contractor or subcontractor's submission of its initial payroll data and two weeks prior to the completion date the contract or subcontract. Subrecipients must conduct more frequent spot checks if the initial spot check or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. In addition, during the examinations the subrecipient shall verify evidence of fringe benefit plans and payments thereunder by contractors and subcontractors who claim credit for fringe benefit contributions.

(d) The subrecipient shall periodically review contractors and subcontractors use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S. Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(e) Subrecipients must immediately report potential violations of the DB prevailing wage requirements to the USEPA DB contact listed above and to the appropriated DOL Wage and Hour District Office listed at http://www.dol.gov/esa/contacts/whd/america2.htm."

*******See Pink Sheets for Davis Wage Rates *******

BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the following unit prices or lump sum:

BID SCHEDULE

NOTE: BIDS shall include sales tax and all other applicable taxes and fees.

Bidder hereby proposes and agrees to furnish all the necessary labor, materials, equipment, tools and services necessary for the construction of the project for the following unit prices:

BASE BID

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1.	Mobilization	1	LS	$_____	$_____
	UNIT PRICE IN WORDS				
2.	Chip Seal Access Road Modifications and Parking Areas	1	LS	$_____	$_____
	UNIT PRICE IN WORDS				
3.	Headworks – Bar Screen/ Grit Removal Structure	1	LS	$_____	$_____
	UNIT PRICE IN WORDS				
4.	Influent – Lift Station and Piping	1	LS	$_____	$_____
	UNIT PRICE IN WORDS				
5.	Headworks Motor Control Center	1	LS	$_____	$_____
	UNIT PRICE IN WORDS				

6.	Influent Flow Measurement Manhole	2	LS	$_____	$_____

_____
UNIT PRICE IN WORDS

7.	Primary and Secondary Clarifier Drive Replacement and Bridge Repainting	4	LS	$_____	$_____

_____
UNIT PRICE IN WORDS

8.	Chlorination Basin Drive Replacement and Bridge Repainting	1	LS	$_____	$_____

_____
UNIT PRICE IN WORDS

9.	Air Header Rehab / Main Air Header Replacements	1	LS	$_____	$_____

A general clarification for Bid Item #9 is as follows "Contractor is not required to remove existing buried air piping. Contractor shall be permitted to cut the existing air piping below grade and grout all open ends with 2' of grout material. Grout should form a complete seal of the air piping to eliminate the infiltration of water and debris." Per add # 2

10.	New Main MCC / Electrical	1	LS	$_____	$_____

_____
UNIT PRICE IN WORDS

11.	Non-Potable Water System	1	LS	$_____	$_____

_____
UNIT PRICE IN WORDS

12.	Tertiary Filter Pump Room Drain Line	1	LS	$_____	$_____

_____
UNIT PRICE IN WORDS

13.	Site / Master SCADA Two (2) Remote Lift Stations	1	LS	$_____	$_____

_____
UNIT PRICE IN WORDS

14.	Doors, Windows, Fascia, Soffit & Brick Maintenance on Ex. Buildings	1	LS	$_____	$_____

Bid Item #14: Tuck pointing shall be required only at openings for new doors and windows per add # 1

_____
UNIT PRICE IN WORDS

15.	Site Restoration / Fencing	1	LS	$_____	$_____

_____
UNIT PRICE IN WORDS

16.	Demolition of Old Headworks	1	LS	$_____	$_____

_____
UNIT PRICE IN WORDS

TOTAL BASE BID (Items 1-16) $_____

MISCELLANEOUS SPARE PARTS

A listing of spare parts called out in specifications is listed below and made part of the Proposal. The Bidder is required to complete this section.

17.	Specification Item No. 09511/1 Suspended Acoustical Ceiling (2 x 2 Ceiling Tile)		144	SF	$_____	$_____
18.	Specification Item No. 11322/4 Grit Screw					
	a.	Hanger Bearing Inserts	2	EA	$_____	$_____
	b.	Bubble Diffusers	6	EA	$_____	$_____
	c.	Blower V-Belts	2	EA	$_____	$_____
19.	Specification Item No. 11332/6 Auto Bar Screen					
	a.	Rake Bars	2	EA	$_____	$_____
	b.	Chain	5	LF	$_____	$_____
	c.	Wiper Arm Wear Pads	1	Pair	$_____	$_____
20.	Specification Item No. 16620/3 Clarifier Drives (12) Shear pins for each drive		12	EA	$_____	$_____

TOTAL FOR SPARE PARTS (Items 17-20) $_____

Amounts are to be shown in both words and figures. In case of discrepancy, the amount in words shall govern.

Bidder is currently certified as an MBE or WBE under EPA's DBE Program? Yes____ No ____

Respectfully submitted:

Signature	Address
Title	Date
Telephone #	E-mail Address

(SEAL - if BID is by a corporation)

Attest _____

MAJOR ITEMS OF EQUIPMENT

It is hereby expressly agreed that the Contractor shall furnish and install in full compliance with the Plans and Contract Documents, the major items of equipment, as manufactured or supplied by the following listed manufacturers or suppliers:

EQUIPMENT LISTING: It is requested that all Bidders complete (and submit with their bid) the equipment listings below that indicates the major equipment (by manufacturer's name) that their Bid is based upon. This is to assist the OWNER in evaluating the bids for possible award. The listing of any manufacturer by the bidder does not automatically deem that equipment to be acceptable. All conditions of the Specifications and Contract Documents must be fulfilled for formal approval by the OWNER.

	Manufacturer
1. Automatic Bar Screen	_____
2. Grit Removal Equipment	_____
3. Clarifier Drives	_____
4. Pumps/Motors	_____
5. Motor Control Center	_____
6. SCADA System	_____

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____ _____ as Principal, and _____as Surety, are hereby held and firmly bound unto _____as OWNER in the penal sum of _____ for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this _____ day of _____, 20 _____.

The Condition of the above obligation is such that whereas the Principal has submitted to _____ a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for the _____ _____ _____ _____

NOW, THEREFORE,

(a) If said BID shall be rejected, or

(b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____ (L.S.)
Principal

_____
Surety

By: _____

IMPORTANT-Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

AGREEMENT

THIS AGREEMENT, made this _____ day of _____, 20 _____, by and between City of Pittsfield, Illinois, hereinafter called "OWNER" and _____ doing business as (an individual) or (a partnership) or (a corporation) hereinafter called "CONTRACTOR".
WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned:

1. The CONTRACTOR will commence and complete the construction of the Wastewater Treatment Plant.

2. The CONTRACTOR will furnish all of the material, supplies, tools, equipment, labor and other services necessary for the construction and completion of the PROJECT described herein.

3. The CONTRACTOR will commence the work required by the Contract Documents within 15 calendar days after the date of the NOTICE TO PROCEED and will complete the same within 365 calendar days unless the period for completion is extended otherwise by the CONTRACT DOCUMENTS.

4. The CONTRACTOR agrees to perform all of the WORK described in the CONTRACT DOCUMENTS and comply with the terms therein for the sum of $_____, or as shown in the BID schedule.

5. The term "CONTRACT DOCUMENTS" means and includes the following:
   (A) Advertisement for BIDS
   (B) Information for BIDDERS
   (C) BID
   (D) BID BOND
   (E) Agreement
   (F) Payment BOND
   (G) Performance BOND
   (H) NOTICE OF AWARD
   (I) NOTICE TO PROCEED
   (J) CHANGE ORDER
   (K) DRAWINGS prepared by MECO Engineering Company, Inc.
   numbered 1 through E-3, and dated August, 2014.
   (L) SPECIFICATIONS prepared or issued by MECO Engineering Company, Inc.
   _____,
   dated August, 2014.

(M) ADDENDA:

No. _____, dated _____, 20_____

No. _____, dated _____, 20 _____

No. _____, dated _____, 20_____

6. The OWNER will pay to the CONTRACTOR in the manner and at such times, such amounts as required by the CONTRACT DOCUMENTS.

7. The contractor shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The contractor shall carry out applicable requirements of 40 CFR Part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. Failure by the contractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies.

8. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement in (five (5)) each of which shall be deemed an original on the date first above written.

OWNER:

City of Pittsfield, Illinois

By _____

Name _____

(Please Type) Title Mayor

(SEAL)

ATTEST:

_____

Name _____

(Please Type)

Title _____

CONTRACTOR:

_____

By _____

Name _____

(Please Type) Address _____

SEAL)

ATTEST:

_____

Name _____

(Please Type)

Title _____

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____
(Name of Corporation)

_____
(Address of Corporation)

a _____ hereinafter called Principal and
(Corporation, Partnership, or Individual)

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto _____

_____
(Name of Owner)

_____
(Address of Owner)

hereinafter called OWNER, in the penal sum of _____

_____ Dollars, ($_____)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____20 _____, a copy of which is hereto attached and made a part hereof for the construction of:

Wastewater Treatment Plant

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed hereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in five (5) counterparts, each one of which shall be deemed an original, this _____ day of _____ 20 _____.

ATTEST:

_____

_____ By: _____

(SEAL)

_____ _____

_____ _____

_____ _____

ATTEST:

_____

(SEAL)

_____ By: _____

_____ _____

_____ _____

NOTE: Date of BOND must not be prior to date of Contract.
If CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the PROJECT is located.

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____, hereinafter called Principal, and
(Corporation, Partnership, or Individual)

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called SURETY, are held and firmly bound unto_____

_____
(Name of Owner)

_____
(Address of Owner)

hereinafter called OWNER, in the penal sum of _____ Dollars, ($_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 20_____, a copy of which is hereto attached and made a part hereof for the construction of :

Wastewater Treatment Plant

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed hereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in five (5) counterparts, each one of which shall be deemed an original, this the _____ day of _____ 20 _____.

ATTEST: _____

_____

(SEAL)

By:_____

_____

_____

_____

_____

_____

_____ _____

ATTEST: By:_____

_____ _____

_____ _____

_____

NOTE: Date of BOND must not be prior to date of Contract.
If CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the PROJECT is located.

NOTICE OF INTENT TO AWARD

To: _____

_____

_____

Project Description: Wastewater Treatment Plant _____

_____

_____

The OWNER has considered the BID submitted by you for the above described WORK, in response to its Advertisement for Bids, dated _____ and Information for Bidders.

You are hereby notified that your BID will be accepted, contingent upon Illinois Environmental Protection Agency (IEPA) approval, for items in the amount of _____.

You will be required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND and certificates of insurance within ten (10) calendar days from the date of the final Notice to be sent upon IEPA approval, to you.

Dated this day of _____

City of Pittsfield, Illinois

OWNER

By: _____

Title: Mayor

NOTICE OF AWARD

To: _____

_____

_____

_____

_____

PROJECT Description: Wastewater Treatment Plant _____

_____

The OWNER has considered the BID submitted by you for the above described WORK in response to its Advertisement for Bids dated _____,20 _____ and Information for Bidders.

You are hereby notified that your BID has been accepted for items in the amount of $_____.

You are required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND and certificates of insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said BONDS within ten (10) days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER'S acceptance of your BID as abandoned and as a forfeiture of your BID BOND. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this _____ day of _____, 20 _____.

City of Pittsfield, Illinois
(Owner)

By _____

Title Mayor

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged,

by _____,

this the _____day of _____, 20 _____.

By _____

Title _____

NOTICE TO PROCEED

To:_____ Date: _____

_____Project: Wastewater Treatment Plant_____

_____

_____

_____

You are hereby notified to commence WORK in accordance with the Agreement dated _____ _____, 20 _____, on or before _____, 20 _____, and you are to complete the WORK within 365 consecutive calendar days thereafter. The date of completion of all WORK is therefore _____, 20 _____.

_____City of Pittsfield, Illinois_____
(Owner)

By _____

Title _____Mayor_____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED
is hereby acknowledged by _____

_____,

this the _____day of

_____, 20 _____.

By _____

Title _____

Change Order

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

Attachments: (Justification and cost breakdown)

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: _____

Prepared by the Engineers' Joint Contract Documents Committee and endorsed by the Associated General Contractors of America and the Construction Specifications Institute.

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY
(EXECUTIVE ORDER 11246)

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:

Timetables	Goals for minority participation for each trade	Goals for female participation in each trade
	Insert goals for* each year _____	Insert goals for* each year _____

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.

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 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 **.

*goals and timetables published from time to time by the Director, Office of Federal Contract Compliance Programs (OFCCP)

**Insert description of the geographical areas where the contract is to be performed giving the state, county and city, if any.

CONSTRUCTION CONTRACTORS AFFIRMATIVE ACTION REQUIREMENTS
GOALS FOR MINORITY PARTICIPATION
(As published in the Friday, October 3, 1980 Federal Register)

FEMALE PARTICIPATION= 6.9% STATEWIDE

County	Percent	County	Percent	County	Percent
Adams	3.1	Jasper	11.4	Randolph	11.4
Alexander	11.4	Jefferson	11.4	Richland	11.4
Bond	11.4	Jersey	11.4	Rock Island	4.6
Boone	6.3	Jo Davis	0.5	Saline	3.5
Brown	3.1	Johnson	11.4	Sangamon	4.5
Bureau	18.4	Kane	19.6	Schuyler	3.3
Calhoun	11.4	Kankakee	9.1	Scott	4
Carroll	3.4	Kendall	18.4	Shelby	4
Cass	4	Knox	3.3	Stark	3.3
Champaign	7.8	Lake	19.6	St. Clair	14.7
Christian	4	La Salle	18.4	Stephenson	4.6
Clark	2.5	Lawrence	3.5	Tazwell	4.4
Clay	11.4	Lee	4.6	Union	11.4
Clinton	14.7	Livingston	18.4	Vermilion	4.8
Coles	4.8	Logan	4	Wabash	3.5
Cook	19.6	Macon	7.6	Warren	3.3
Crawford	2.5	Macoupin	11.4	Washington	11.4
Cumberland	4.8	Madison	14.7	Wayne	11.4
De Kalb	18.4	Marion	11.4	White	3.5
De Witt	4	Marshall	3.3	Whiteside	3.4
Douglas	4.8	Mason	3.3	Will	20.9
Du Page	19.6	Massac	5.2	Williamson	11.4
Edgar	4.8	McDonough	3.3	Winnebago	6.3
Edwards	3.5	McHenry	19.6	Woodford	4.4
Effingham	11.4	McLean	2.5		
Fayette	11.4	Menard	4.5		
Ford	4.8	Mercer	3.4		
Franklin	11.4	Monroe	14.7		
Fulton	3.3	Montgomery	11.4		
Gallatin	3.5	Morgan	4		
Greene	11.4	Moultrie	4		
Grundy	18.4	Ogle	4.6		
Hamilton	3.5	Peoria	4.4		
Hancock	3.4	Perry	11.4		
Hardin	5.2	Piatt	4.8		
Henderson	3.4	Pike	3.1		
Henry	4.6	Pope	5.2		
Iroquois	18.4	Pulaski	11.4		
Jackson	11.4	Putnam	18.4		

41 CFR 60

60-4.1 Scope and Application.

This part applies to all contractors and subcontractors that hold any Federal or federally assisted construction contract in excess of $10,000. The regulations in this part are applicable to all of a construction contractor's or subcontractor's construction employees who are engaged in on site construction including those construction employees who work on a non-Federal or non-federally assisted construction site. This part also establishes procedures, which all Federal contracting officers and all applicants, as applicable, shall follow in soliciting for and awarding Federal or federally assisted construction contracts. Procedures also are established which administering agencies shall follow in making any grant, contract, loan, insurance, or guarantee involving federally assisted construction which is not exempt from the requirements of Executive Order 11246, as amended. In addition, this part applies to construction work performed by construction contractors and subcontractors for Federal non-construction contractors and subcontractors if the construction work is necessary in whole or in part to the performance of a non-construction contract or subcontract.

[43 FR 49254, OCT. 20, 1978; 43 FR 51404, NOV. 3, 1978]

60-4.2 Solicitations.

(a) All Federal contracting officers and all applicants shall include the notice set forth in paragraph (d) of this section and the Standard Federal Equal Employment Opportunity Construction Contract Specifications set forth in § 60-4.3 of this part in all solicitations for offers and bids on all Federal and federally assisted construction contracts or subcontracts to be performed in geographical areas designated by the Director pursuant to § 60-4.6 of the part. Administering agencies shall require the inclusion of the notice set forth in paragraph (d) of this section and the specifications set forth in § 60-4.3 of this part as a condition of any grant, contract, subcontract, loan, insurance or guarantee involving federally assisted construction covered by this Part 60-4.

(b) All non-construction contractors covered by Executive Order 11246 and the implementing regulations shall include the notice in paragraph (d) of this section in all construction agreements, which are necessary in whole or in part to the performance of the covered non-construction contract.

(c) Contracting officers, applicants and non-construction contractors shall given written notice to the Director within 10 working days of award of a contract subject to these provisions. The notification shall include the name, address and telephone number of the contractor; employer identification number; dollar amount of the contract, estimated starting and completion dates of the contract; the contract number; and geographical area in which the contract is to be performed.

(d) The following notice shall be included in, and shall be a part of, all solicitations for offers and bids on all Federal and federally assisted construction contracts or subcontracts in excess of $10,000 to be performed in geographical areas designated by the Director pursuant to § 60-4.6 of this part (see 41 CFR 60-4.2(a)):

Notice of Requirement for Affirmative Action To Ensure Equal Employment Opportunity (Executive Order 11246)

1. The Offeror or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment 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:

Time-tables	Goals for minority participation for each trade	Goals for female participation in each trade
	Insert goals for each year.	Insert goals for each year.

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 geographical area located outside of the covered area, it shall apply the goals established for such geographical 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 nonfederally 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. 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 of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract 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).

[43 FR 49254, OCT. 20, 1978; 43 FR 51401, NOV. 3, 1978, AS AMENDED AT 45 FR 65977, OCT. 3, 1980]

60-4.3 Equal Opportunity Clauses.

(a) The equal opportunity clause published at 41 CFR 60-1.4(a) of this chapter is required to be included in, and is part of, all nonexempt Federal contracts and subcontracts, including construction contracts and subcontracts. The equal opportunity clause published at 41 CFR 60-1.4(b) is required to be included in, and is a part of, all nonexempt federally assisted construction contracts and subcontracts. In addition to the clauses described above, all Federal contracting officers, all applicants and all non-construction

contractors, as applicable, shall include the specifications set forth in this section in all Federal and federally assisted construction contracts in excess of $10,000 to be performed in geographical areas designated by the Director pursuant to § 60-4.6 of this part and in construction subcontracts in excess of $10,000 necessary in whole or in part to the performance of non-construction Federal contracts and subcontracts covered under the Executive order.

Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246)

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 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 reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction contractors performing construction work 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 geographical area where the work 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, nor the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, the Contractor must employ such apprentices and trainees 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 action 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 foremen, 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 7b 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 onsite 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 (7a 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 7a 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 workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation 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 goals 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, status (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).

(b) The notice set forth in 41 CFR 60-4.2 and the specifications set forth in 41 CFR 60-4.3 replace the New Form for Federal Equal Employment Opportunity Bid Conditions for Federal and Federally Assisted Construction published at 41 FR 32482 and commonly known as the Model Federal EEO Bid Conditions, and the New Form shall not be used after the regulations in 41 CFR Part 60-4 become effective.

[43 FR 49254, OCT. 20, 1978; 43 FR 51401, NOV. 3, 1978, AS AMENDED AT 45 FR 65978, OCT. 3, 1980]

60-4.4 Affirmative Action Requirements.

(a) To implement the affirmative action requirements of Executive Order 11246 in the construction industry, the Office of Federal Contract Compliance Programs previously has approved affirmative action programs commonly referred to as "Hometown Plans," has promulgated affirmative action plans referred to as "Imposed Plans" and has approved "Special Bid Conditions" for high impact projects constructed in areas not covered by a Hometown or an Imposed Plan. All solicitations for construction contracts made after the effective date of the regulations in this part shall include the notice specified in § 60-4.2 of this part and the specifications in § 60-4.3 of this part in lieu of the Hometown and Imposed Plans including the Philadelphia Plan and Special Bid Conditions. Until the Director has issued an order pursuant to § 60-4.6 of this part establishing goals and timetables for minorities in the appropriate geographical areas or for a project covered by Special Bid Conditions, the goals and timetables for minorities to be inserted in the Notice required by 41 CFR 60-4.2 shall be the goals and timetables contained in the Hometown Plan, Imposed Plan or Special Bid Conditions presently covering the respective geographical area or project involved.

(b) Signatories to a Hometown Plan (including heavy highway affirmative action plans) shall have 45 days from the effective date of the regulations in this part to submit under such a Plan (for the director's approval) goals and timetables for women and to include female representation on the Hometown Plan Administrative Committee. Such goals for female representation shall be at least as high as the goals established for female representation in the notice issued pursuant to 41 CFR 60-4.6. Failure of the signatories, within the 45-day period, to include female representation and to submit goals for women or a new plan, as appropriate, shall result in an automatic termination of the Office of Federal Contract Compliance Program's approval of the Hometown Plan. At any time the Office of Federal Contract Compliance Programs terminates or withdraws its approval of a Hometown Plan, or when the plan expires and another plan is not approved, the contractors signatory to the plan shall be covered automatically by the specifications set forth in § 60-4.3 of this part and by the goals and timetables established for that geographical area pursuant to § 60-4.6 of this part.

60-4.5 Hometown Plans

(a) A contractor participating, either individually or through an association, in an approved Hometown Plan (including heavy highway affirmative action plans) shall comply with its affirmative action obligations under Executive Order 11246 by complying with its obligations under the plan: *Provided,* That each contractor or subcontractor participating in an approved plan is individually required to comply with the equal opportunity clause set forth in 41 CFR 60-1.4; to make a good faith effort to achieve the goals for each trade participating in the plan in which it has employees; and that the overall good 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's goals and timetables. If a contractor is not participating in an approved Hometown Plan it shall comply with the specifications set forth in § 60-4.3 of this part and with the goals and timetables for the appropriate area as listed in the notice required by 41 CFR 60-4.2 with regard to that trade. For the purposes of this part 60-4, a contractor is not participating in a Hometown Plan for a particular trade if it:

(1) Ceases to be signatory to a Hometown Plan covering that trade;

(2) Is signatory to a Hometown Plan for that trade but is not party to a collective bargaining agreement for that trade;

(3) Is signatory to a Hometown Plan for that trade but is party to a collective bargaining agreement with labor organizations, which are not or cease to be signatories to the same Hometown Plan for that trade;

(4) Is signatory to a Hometown Plan for that trade but is party to a collective bargaining agreement with a labor organization for that trade but the two have not jointly executed a specific commitment to minority and female goals and timetables and incorporated the commitment in the Hometown Plan for that trade;

(5) Is participating in a Hometown Plan for that trade which is no longer acceptable to the Office of Federal Contract Compliance Programs;

(6) Is signatory to a Hometown Plan for that trade but is party to a collective bargaining agreement with a labor organization for that trade and the labor organization and the contractor have failed to make a good faith effort to comply with their obligations under the Hometown Plan for that trade.

(b) Contractors participating in Hometown Plans must be able to demonstrate their participation and document their compliance with the provision of the Hometown Plan.

[43 FR 49254, OCT. 20, 1978; 43 FR 51401, NOV. 3, 1978]

60-4.6 Goals and Timetables.

The Director, from time to time, shall issue goals and timetables for minority and female utilization, which shall be based on appropriate workforce, demographic, or other relevant data and which shall cover construction projects or construction contracts performed in specific geographical areas. The goals, which shall be applicable to each construction trade in a covered contractor's or subcontractor's entire workforce which is working in the area covered by the goals and timetables, shall be published as notices in the Federal Register, and shall be inserted by the contracting officers and applicants, as applicable, in the Notice required by 41 CFR 60-4.2. Covered construction contractors performing construction work 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 geographical area where the work is being performed.

[45 FR 65978, OCT. 3, 1980]

60-4.7 Effect on Other Regulations.

The regulations in this part are in addition to the regulations contained in this chapter, which apply to construction contractors and subcontractors generally. See particularly, 41 CFR 60-1.4 (a), (b), (c), (d), and (e); 60-1.5; 60-1.7; 60-1.8; 60-1.26; 60-1.29; 60-1.30; 60-1.32; 60-1.41; 60-1.42; 60-1.43; and 41 CFR Part 60-3; Part 60-20; Part 60-30; Part 60-40; and Part 60-50.

60-4.8 Show Cause Notice.

If an investigation or compliance review reveals that a construction contractor or subcontractor has violated the Executive order, any contract clause, specifications or the regulations in this chapter and if administrative enforcement is contemplated, the Director shall issue to the contractor or subcontractor a notice to show cause which shall contain the items specified in paragraphs (i) through (iv) of 41 CFR 60-2.2(c)(1). If the contractor does not show good cause within 30 days, or in the alternative, fails to enter an acceptable conciliation agreement which includes where appropriate, make up goals and timetables, back pay, and seniority relief for affected class members, the OFCCP shall follow the procedure in 41 CFR 60-1.26(b): *Provided,* That where a conciliation agreement has been violated, no show cause notice is required prior to the initiation of enforcement proceedings.

[43 FR 49254, OCT. 20, 1978; 43 FR 51401, NOV. 3, 1978]

60-4.9 Incorporation by Operation of the Order.

By operation of the order, the equal opportunity clause contained in § 60-1.4, the Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246) contained in § 60-4.2, and the Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246) contained in § 60-4.3 shall be deemed to be a part of every solicitation or of every contract and subcontract, as appropriate, required by the order and the regulations in this chapter to include such clauses whether or not they are physically incorporated in such solicitation or contract and whether or not the contract is written.

U.S. ENVIRONMENTAL PROTECTION AGENCY

CERTIFICATION OF NONSEGREGATED FACILITIES

(Applicable to federally assisted construction contracts and related subcontracts exceeding $10,000 that are not exempt from the Equal Opportunity clause.)

The federally assisted construction contractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction contractor certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction contractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest 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. The federally assisted construction contractor agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he 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, and that he will retain such certification in his files.

_____

Signature Date

_____

Name and Title of Signer (Please type)

_____

Firm Name

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

NOTICE TO LABOR UNIONS OR OTHER ORGANIZATIONS OF WORKERS

NONDISCRIMINATION IN EMPLOYMENT

To: _____
(Name of union or organization of workers)

The undersigned currently holds contract(s) with _____
(name of applicant)
involving funds or credit of the U.S. Government or (a) subcontract(s) with a prime contractor holding such contract(s).

You are advised that under the provisions of the above contracts(s) or subcontract(s) and in accordance with Executive Order 11246, as amended, dated September 24, 1965, as amended, the undersigned is obliged not to discriminate against any employee or applicant for employment because of race, color, creed or national origin. This obligation not to discriminate in employment includes, but is not limited to, the following:

HIRING, PLACEMENT, UPGRADING, TRANSFER OR DEMOTION, RECRUITMENT, ADVERTISING, OR SOLICITATION FOR EMPLOYMENT, TRAINING DURING EMPLOYMENT, RATES OF PAY OR OTHER FORMS OF COMPENSATION, SELECTION FOR TRAINING INCLUDING APPRENTICESHIP, LAYOFF OR TERMINATION.

This notice is furnished you pursuant to the provisions of the above contract(s) or subcontracts(s) and Executive Order 11246, as amended.

Copies of this notice will be posted by the undersigned in conspicuous places available to employees or applicants for employment.

_____

_____

_____

_____
(Contractor or Subcontractor)

_____
(Date)

EPA Project Control #: _____

United States Environmental Protection Agency
Washington, DC 20460

Certification Regarding Debarment, Suspension and Other Responsibility Matters

The prospective participant to the best of its knowledge and belief that it and its principles:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(b) Have not within a three year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.

(c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1) (b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

I understand that a false statement on this certification may be grounds for rejection of this proposal or termination of the award. In addition, under 18 USC Sec. 1001, a false statement may result in fine of up to $10,000 or imprisonment for up to 5 years, or both.

_____
(Typed Name & Title of Authorized Representative)

_____
(Signature of Authorized Representative) (Date)

_____

☐ I am unable to certify the above statements. My explanation is attached.

EPA FORM 5700-49 (11-88)

Instructions

Under Executive Order 12549 an individual or organization debarred or excluded from participation in Federal assistance or benefit programs may not receive any assistance award under a Federal program, or a sub-agreement thereunder for $25,000 or more.

Accordingly, each prospective recipient of an EPA grant, loan, or cooperative agreement and any contract or sub-agreement participant thereunder must complete the attached certification or provide an explanation why they cannot. For further details, see 40 CFR 32.510, Participants' responsibilities, in the attached regulation.

Where to Submit

The prospective EPA grant, loan, or cooperative agreement recipient must return the signed certification or explanation with its application to the appropriate EPA Headquarters or Regional office, as required in the application instructions.

A prospective prime contractor must submit a completed certification or explanation to the individual or organization awarding the contract.

Each prospective subcontractor must submit a completed certification or explanation to the prime contractor for the project.

How to Obtain Forms:

EPA includes the certification form, instructions, and a copy of its implementing regulation (40 CFR Part 32) in each application kit. Applicants may reproduce these materials as needed and provide them to their prospective prime contractor, who, in turn, may reproduce and provide them to prospective subcontractors.

Additional copies/assistance may be requested from:

Compliance Branch
Grants Administration Division (PM-216F)
U.S. Environmental Protection Agency
401 M Street, SW
Washington DC 20460
(Telephone: 202-475-8025)

Construction Contracts of Loan Recipient and Other Sections From "Procedures For Issuing Loans From the Water Pollution Control Loan Program"

Section 365.620(c) Negotiations of Contract Amendments (Change Orders)

2) Changes in contract price or time

The contract price or time may be changed only by a change order. When negotiations are required, they shall be conducted in accordance with subsection (c) of this Section.

3) For each change order the contractor shall submit to the loan recipient for review sufficient cost and pricing data to enable the loan recipient to ascertain the necessity and reasonableness of costs and amounts proposed, and the allowability and eligibility of costs proposed.

Section 365.620(d) Required Construction Contract Provisions

Each construction contract shall include the following provisions:

1) Audit; access to records:

A) The contractor shall maintain books, records, documents and other evidence directly pertinent to performance on loan work in accordance with Generally Accepted Accounting Principles (GAAP). The contractor shall also maintain the financial information and data used by the contractor in the preparation or support of any cost submissions required under subsection (c) above, (Negotiation of Contract Amendments, Change Orders) and a copy of the cost summary submitted to the owner. The Auditor General, the owner, the Agency, or any of their duly authorized representatives shall have access to the books, records, documents, and other evidence for purposes of inspection, audit, and copying. The contractor will provide facilities for such access and inspection.

B) If this contract is a formally advertised, competitively awarded, fixed price contract, the contractor agrees to include access to records as specified in subsection (d)(1)(A) above. This requirement is applicable to all negotiated change orders and contract amendments in excess of $25,000 that affect the contract price. In the case of all other prime contracts, the contractor also agrees to include access to records as specified above in all his or her contracts and all tier subcontracts or change orders in excess of $25,000 that are directly related to project performance.

C) Audits shall be consistent in accordance with auditing standards generally accepted in the United States of America.

D) The contractor agrees to the disclosure of all information and reports resulting from access to records pursuant to subsection (d)(1)(A) above. Where the audit concerns the contractor, the auditing agency will afford the contractor an opportunity for an audit exit conference and an opportunity to comment on the pertinent portions of the draft audit report. The final audit report shall include the written comments, if any, of the audited parties.

E) The records required by subsection (d)(1)(A) above shall be maintained and made available during performance of the work under the loan agreement and for three years after the date of the final loan audit. In addition, records that relate to any dispute or litigation or the settlement of claims arising out of any performance, costs or items to which an audit exception has been taken, shall be maintained and made available for three years after resolution of the dispute, appeal, litigation, claim or exception.

F) The right of access will generally be exercised with respect to financial records under:

i) Negotiated prime contracts;

ii) Negotiated change orders or contract amendments in excess of $25,000 affecting the price of any formally advertised, competitively awarded, fixed price contract; and

iii) Subcontracts or purchase orders under any contract other than a formally advertised, competitively awarded, fixed price contract.

G) The right of access will generally not be exercised with respect to a prime contract, subcontract, or purchase order awarded after effective price competition. In any event, the right of access shall be exercised under any type of contract or subcontract:

i) With respect to records pertaining directly to contract performance, excluding any financial records of the contractor; and

ii) If there is any indication that fraud, gross abuse, or corrupt practices may be involved in the award or performance of the contract or subcontract.

2) Covenant against contingent fees.

The contractor shall warrant that no person or selling agency has been employed or retained to solicit or secure the contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee. For breach or violation of this warranty, the owner shall have the right to annul the contract without liability or in its discretion to deduct from the contract price or consideration, or otherwise recover, the full amount of such commission, percentage, brokerage, or contingent fee.

3) Wage provisions.

The Contractor shall pay prevailing wages in accordance with the Davis-Bacon Act (40 USC 276a through 276a-5 as defined by the U.S. Department of Labor. More information and guidance on the Davis-Bacon Wage Rate requirements is available on the IEPA web site at: http://www.epa.state.il.us/water/forms.html#financial-assistance.

4) Disadvantaged business enterprise requirements.

The contractor shall provide evidence, including, but not limited to, a copy of the advertisement or advertisements and the record of negotiation, that the contractor has take affirmative steps in accordance with 40 CFR, Part 33 to assure that disadvantaged business enterprises are used when possible as sources of supplies, equipment, construction and services consistent with the provisions of the Agency's Operating Agreement with USEPA.

5) Debarment and suspension provisions.

The contract shall require the successful bidder or bidders to submit a "Certificate Regarding Debarment, Suspension and Other Responsibility Matters" (EPA Form 5700-49) showing compliance with federal Executive Order 12549 (Appendix A, Exhibit C).

6) Non-segregated facilities provisions

The successful bidder shall be required to submit a certification of non-segregated facilities as prescribed by 18 USC 1001.

Section 365.620(e) Subcontracts Under Construction Contracts

The award or execution of all subcontracts by a prime contractor and the procurement and negotiation procedures used by the prime contractor shall comply with:

1) All applicable provisions of federal, State and local law;

2) All provisions of this Part 365 with respect to fraud and other unlawful or corrupt practices;

3) All provisions of this Part 365 with respect to access to facilities, records and audit of records; and

4) All provisions of subsection (d)(5) that require a "Certification Regarding Debarment, Suspension, and Other Responsibility Matters (EPA Form 5700-49) showing compliance with federal Executive Order 12549 (Appendix A, Exhibit C).

Section 365.620(f) Contractor Bankruptcy

In the event of a contractor bankruptcy, the loan recipient shall notify the Agency and shall keep the Agency advised of any negotiations with the bonding company, including any proposed settlement. The Agency may participate in those negotiations and will advise the loan recipient of the impact of any proposed settlement to the loan agreement. The loan recipient shall be responsible for assuring that every appropriate procedure and incidental legal requirement is observed in advertising for bids and re-awarding a construction contract.

Section 365.640(c) Remedies

All claims, counter-claims, disputes and other matters in question between the loan applicant and the contractor arising out of, or relating to a sub-agreement or its breach shall be decided by arbitration if the parties agree, or in a court of competent jurisdiction within the State.

Section 365.810(b) Access

Every contract entered into by the loan recipient for construction work, and every sub-agreement, shall provide the Agency representatives with access to the work. The contractor or subcontractor shall provide facilities for such access and inspection. The contract or sub-agreement shall also provide that the Agency or any authorized representative shall have access to any books, documents, papers and records that are pertinent to the project for the purpose of making audit, examination, excerpts and transcriptions.

Bidder Certification
In Compliance with Article 33E to the
"Criminal Code of 1961"

I _____, do hereby certify that:
Name

1. I am _____ of the _____
Position Firm
and have authority to execute this certification on behalf of the firm

2. This firm is not barred from bidding on this contract as a result of a violation of either Section 33E-3, Bid-rigging, or Section 33E-4, Bid Rotating, as set forth in Article 33E to the "Criminal Code of 1961."

Name of Firm _____

Signature _____

Title _____

Date _____
Corporate Seal (where appropriate)

On this _____day of _____20_____, before me appeared (Name)

_____ to me personally known, who, being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by (Name of Firm) _____ to execute the affidavit and did so as his or her free act and deed.

Notary Public _____Commission Expires _____

Notary Seal

Specification for Disadvantaged Business Enterprise Participation
(Name of Loan Recipient) _____

I. Disadvantaged Business Enterprise Policy

A. It is the policy of the State of Illinois to award a fair share of sub-agreements to disadvantaged businesses. In complying with this requirement, contractors are required to take affirmative steps to assure that disadvantaged businesses are used when possible as sources of supplies, equipment, construction, and services as explained herein.

B. These specifications define the terms, conditions, and requirements of the State Revolving Fund Loan Program, and the (Name of Loan Recipient) _____policy and procedures for complying with these requirements.

C. As required by the award conditions of USEPA's Assistance Agreement with IEPA, the fair share percentages are 5% for MBEs and 12% for WBEs.

II. Pre-Contract Award Obligations

A. Bidders are required to advertise subcontracting opportunities and to negotiate with disadvantaged businesses prior to bid opening. Failure to document such affirmative efforts shall be deemed, relative to disadvantaged business compliance non-responsive.

B. To establish a bid as responsible, the bidder will be required to document the proposed utilization of disadvantaged businesses with letters of intent signed by the bidder and by the disadvantaged business listed in the bid. The documentation requirements are outlined in Section III.

C. (Name of Loan Recipient) _____ disadvantaged business policy clearly intends for bidders to contact and encourage the participation of disadvantaged businesses prior to bid opening. Affirmative efforts (the written record of conscientious and honest communications between the bidder and disadvantaged business) must be initiated and completed by the bidder prior to bid opening. All bidders must document compliance with the requirements of the disadvantaged business policy.

III. Evaluation of Disadvantaged Business Utilization and Affirmative Efforts

A. As a prerequisite to demonstrate compliance with the (Name of Loan Recipient) _____ disadvantaged business policy, ALL bidders shall provide the following with its bid:

1. Completed and signed certification from the bidder(s), attesting that the bidder will award no sub-agreements, including the procurement of equipment, materials, supplies and services, in the performance of this contract.

OR

2. "Certification of publication," or adequate evidence of proof of publication, including an actual copy of the newspaper advertisement from the "key" newspaper utilized by each bidder based upon the projects locality (reference attached map of Illinois identifying the "key" newspaper to be utilized by each region). The advertisement (reference attached

"suggested" advertisement) must run one day at least **(16) days prior** to bid opening.

3. List of all disadvantaged business enterprise (DBE) and non-DBE's that submitted proposals to the bidder along with the date of the proposal.

4. List of disadvantaged businesses not being utilized and justification for non-utilization.

5. Certification from the Bidder that Form 6100-2 (DBE Subcontractor Participation Form) has been provided to DBE subcontractors being utilized.

6. Completed and signed copies of Forms 6100-3 (DBE Subcontractor Performance Form) and Form 6100-4 (DBE Subcontractor Utilization Form). Only applies if DBE subcontractors are used.

7. Completed and signed certification from the bidder(s) utilizing disadvantaged businesses, attesting that the bidder has no controlling or dominating interest or conflict of interest with the disadvantaged business that is proposed to be utilized (reference attached certification for the information necessary).

8. In instances where the bidder(s) does not receive any proposals from disadvantaged businesses prior to bid opening, the bidder(s) must provide a written certification attesting that no proposals were received (reference attached certification for information necessary).

NOTE: Data Sheet #1 may be used for this purpose.

Failure to submit the documentation pursuant to the requirements of A (1-8) above may cause rejection of the bid as non-responsive.

B. The low, responsive bidder will be deemed responsible with respect to the disadvantaged business requirements if:

1. The low, responsive bidder submits Form 6100-3 (DBE Subcontractor Performance Form) and Form 6100-4 (DBE Subcontractor Utilization Form.

Failure to submit the documentation pursuant to the requirements of B(1) above may cause rejection of the bid as non-responsible.

Where the bidder is considered non-responsible under this subsection, the owner will promptly advise the bidder, in writing, of the basis for the non-responsibility determination.

IV. Sanctions

A. The (Name of Loan Recipient) _____ may reject one or all bids where the information submitted by the bidder(s) fails to objectively demonstrate compliance with the disadvantaged business requirements (i.e., failure to place the pre-bid advertisement by the bidder(s) at least (16) days prior to bid opening shall not be considered as objectively demonstrating compliance with the disadvantaged business requirements).

B. Upon finding that any Party has not complied with the requirements of these specifications, including misrepresenting a firm as a disadvantaged business, any one or a combination of the following actions may be taken.

1. Declare the bidder and/or subcontractor non-responsible and therefore ineligible for contract award.

2. Disallow all contract costs associated with non-compliance.

3. Refer any matter, which may be fraudulent to the Illinois Attorney General.

4. Refer any matter, which may lead to criminal prosecution of a claim for funds to the Illinois Attorney General.

V. Post-Contract Award Compliance

A. As required by the award conditions of USEPA's Assistance Agreement with IEPA, all sub-agreements of the prime contractor must identify that the fair share percentages are 5% for MBEs and 12 % for WBEs.

B. After award of the prime contract copies of all disadvantaged business related sub-agreements between the prime contractor and subcontractors shall be submitted to the owner.

C. Subsequent to Bid Submission, any changes in previously reported disadvantaged businesses utilization shall be handled in accordance with Part 33.302(b-h). If the contractor fails to initiate such actions, the owner may withhold payments and/or institute other appropriate sanctions.

Bidder Certification

I_____, do hereby certify that:
(Name)

1. I am _____ of the_____
(Position) (Firm)

and have authority to execute this certification on behalf of the firm;

2. This firm will award no sub-agreements, including the procurement of equipment, materials, supplies, and services, in the performance of this contract.

Name of Firm

_____

Signature

_____

Title _____

Date_____

Corporate Seal (where appropriate)

Suggested Disadvantaged Business
Advertisement for Construction Contractors

Notice to Disadvantaged Businesses

_____, _____, _____, is
(Name of Company) (Address of Company) (Telephone)

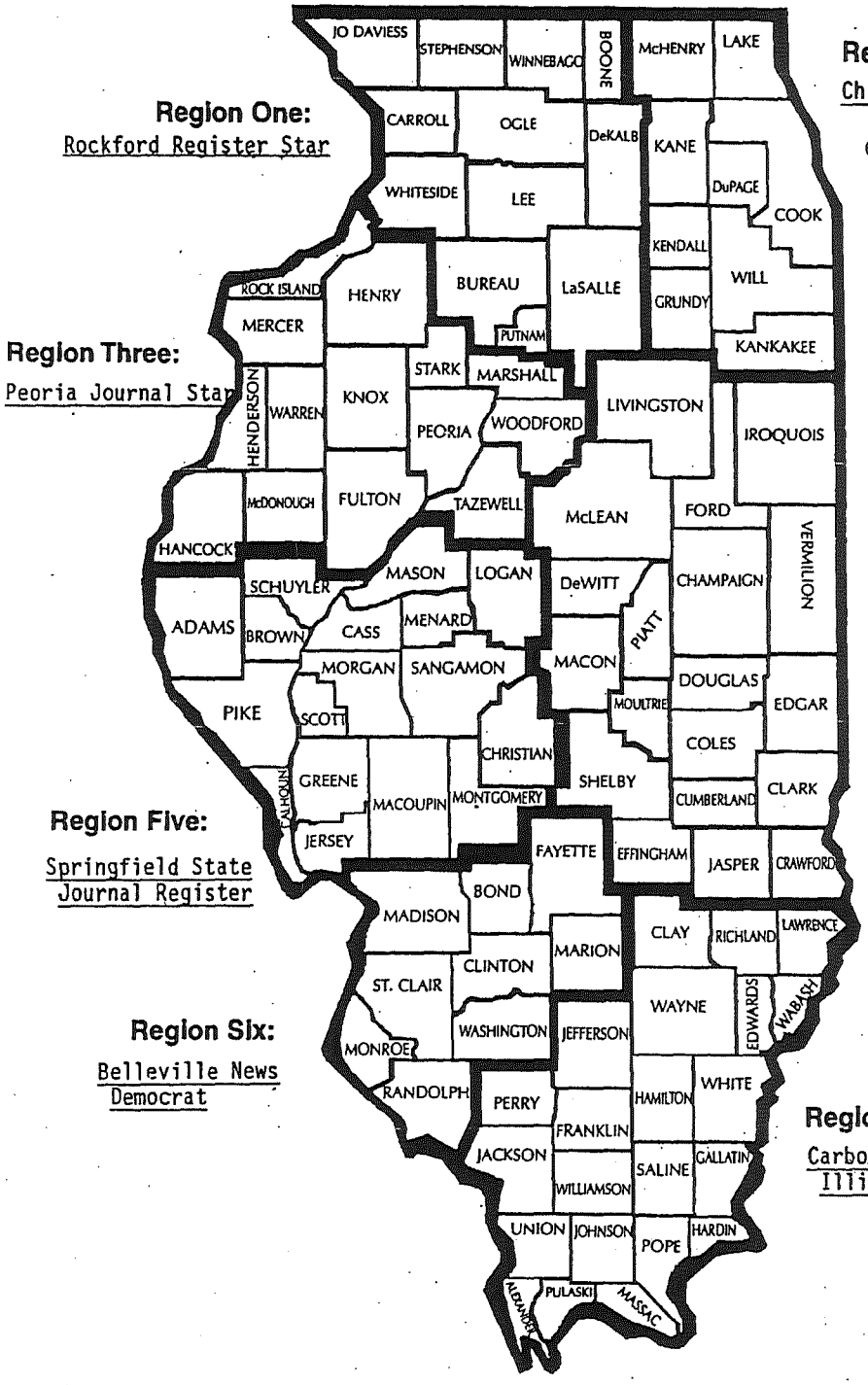
seeking disadvantaged businesses for the_____
(Name of Loan Recipient)

Project for subcontracting opportunities in the following areas: _____, _____, _____, _____

All disadvantaged businesses should contact, IN WRITING, (certified letter, return receipt requested), _____ to discuss the subcontracting opportunities. All negotiations must
(Company Contact Person)

be completed prior to bid opening _____.
(Date of Bid Opening)

*The advertisement must clearly state the method of evaluating the proposals or quotations, and the relative importance attached to each criterion. Bidders must uniformly and objectively evaluate the proposals submitted by disadvantaged business in response to the advertisement based upon the evaluation criteria stated in the advertisement. The evaluation criteria must not be restrictive or exclusionary.


JO DAVIESS
STEPHENSON
WINNEBAGO
BOONE
McHENRY
LAKE
CARROLL
OGLE
DeKALB
KANE
DuPAGE
COOK
WHITESIDE
LEE
KENDALL
WILL
ROCK ISLAND
HENRY
BUREAU
LaSALLE
GRUNDY
MERCER
PUTNAM
KANKAKEE
STARK
MARSHALL
HENDERSON
WARREN
KNOX
PEORIA
WOODFORD
LIVINGSTON
IROQUOIS
McDONOUGH
FULTON
TAZEWELL
McLEAN
FORD
HANCOCK
VERMILION
SCHUYLER
MASON
LOGAN
DeWITT
CHAMPAIGN
ADAMS
BROWN
CASS
MENARD
PIATT
MORGAN
SANGAMON
MACON
DOUGLAS
PIKE
SCOTT
MOULTRIE
EDGAR
CHRISTIAN
COLES
CALHOUN
GREENE
MACOUPIN
MONTGOMERY
SHELBY
CUMBERLAND
CLARK
JERSEY
FAYETTE
EFFINGHAM
JASPER
CRAWFORD
BOND
MADISON
CLAY
RICHLAND
LAWRENCE
MARION
CLINTON
ST. CLAIR
WAYNE
EDWARDS
WABASH
WASHINGTON
JEFFERSON
MONROE
RANDOLPH
PERRY
HAMILTON
WHITE
FRANKLIN
JACKSON
SALINE
GALLATIN
WILLIAMSON
UNION
JOHNSON
POPE
HARDIN
ALEXANDER
PULASKI
MASSAC
Region One:
Rockford Register Star
Region Two:
Chicago Tribune
City Edition Only
Region Three:
Peoria Journal Star
Region Four:
Decatur Herald & Review
Region Five:
Springfield State Journal Register
Region Six:
Belleville News Democrat
Region Seven:
Carbondale Southern Illinoisan

Data Sheet #1 Disadvantaged Business Participation Documentation

1) Completed and signed certification from bidder(s), attesting that the bidder will award no sub-agreements, including the procurement of equipment, materials, supplies and services in the performance of this contract.

OR

2) "Certificate of publication, or adequate evidence of proof of publication, including an actual copy of the newspaper advertisement from the "key" newspaper utilized by each bidder based upon the projects locality.

Dates of bidder advertisement:_____

Date of bid opening:_____

3) List of all disadvantaged business enterprises (DBE) and non-DBE's that submitted proposals to the bidder. Specify as DBE*, along with the type of DBE, or non-DBE* with the following information:

Name of Company:
Name of Owners:
Address of Company:
E-mail Address of Company:
Telephone Number:
Date of Proposal:
*_____Business_____Type of DBE:
Description of work to be performed

(Furnish data for additional subcontractors on plain bond paper).

4) List of disadvantaged businesses that submitted proposals to the bidder but will not be utilized. Justification for non-utilization must be provided.

(If necessary, furnish data on plain bond paper.)

5) Certification from the Bidder that Form 6100-2 (DBE Subcontractor participation Form) has been provided to DBE subcontractors being utilized.

6) Completed and signed copies of Forms 6100-3 (DBE Subcontractor Performance Form) and Form 6100-4 (DBE Subcontractor Utilization Form).

7) Completed and signed certification from bidder(s) attesting that the bidder has no dominating or conflict of interest with the disadvantaged business to be utilized.

8) In instances where the bidder(s) does not receive any proposals from disadvantaged businesses prior to bid opening, the bidder(s) must provide a written certification attesting that no proposals were received.

Bidder Certification Regarding the Use of Disadvantaged Businesses

I, _____ , do hereby certify that:
Name

1. I am_____ of the _____ and have authority to execute this certification on behalf of the firm;

2. This firm, its partners or directors and officers does not possess a controlling interest in ownership or conflict of interest or any other authority to control the disadvantaged business to be used during the performance of the contracts.

3. Form 6100-2 (DBE Subcontractor Participation Form) has been provided to all disadvantaged subcontractors being utilized.

Name of Firm_____

Signature_____

Title

_____

Date

_____

Corporate Seal (where appropriate)

EPA United States Environmental Protection Agency

OMB Control No: 2090-0030
Approved: 8/13/2013
Approval Expires: 8/31/2015

Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Participation Form

An EPA Financial Assistance Agreement Recipient must require its prime contractors to provide this form to its DBE subcontractors. This form gives a DBE[1] subcontractor[2] the opportunity to describe work received and/or report any concerns regarding the EPA-funded project (e.g., in areas such as termination by prime contractor, late payments, etc.). The DBE subcontractor can, as an option, complete and submit this form to the EPA DBE Coordinator at any time during the project period of performance.

Subcontractor Name		Project Name
Bid/ Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact
Address		
Telephone No.		Email Address
Prime Contractor Name		Issuing/Funding Entity:

Contract Item Number	Description of Work Received from the Prime Contractor Involving Construction, Services, Equipment or Supplies	Amount Received by Prime Contractor

[1] A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

[2] Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

United States Environmental Protection Agency

OMB Control No: 2090-0030
Approved: 8/13/2013
Approval Expires: 8/31/2015

Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Performance Form

This form is intended to capture the DBE[1] subcontractor's[2] description of work to be performed and the price of the work submitted to the prime contractor. An EPA Financial Assistance Agreement Recipient must require its prime contractor to have its DBE subcontractors complete this form and include all completed forms in the prime contractors bid or proposal package.

Subcontractor Name		Project Name
Bid/ Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact
Address		
Telephone No.		Email Address
Prime Contractor Name		Issuing/Funding Entity:

Contract Item Number	Description of Work Submitted to the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor

DBE Certified By: ___ DOT ___ SBA ___ Other: _____	Meets/ exceeds EPA certification standards? ___ YES ___ NO ___ Unknown

[1] A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

[2] Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

EPA United States Environmental Protection Agency

OMB Control No: 2090-0030
Approved: 8/13/2013
Approval Expires: 8/31/2015

Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Utilization Form

This form is intended to capture the prime contractor's actual and/or anticipated use of identified certified DBE[1] subcontractors[2] and the estimated dollar amount of each subcontract. An EPA Financial Assistance Agreement Recipient must require its prime contractors to complete this form and include it in the bid or proposal package. Prime contractors should also maintain a copy of this form on file.

Prime Contractor Name		Project Name
Bid/ Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact
Address		
Telephone No.		Email Address
Issuing/Funding Entity:		

I have identified potential DBE certified subcontractors	__ YES	__ NO
If yes, please complete the table below. If no, please explain:		

Subcontractor Name/ Company Name	Company Address/ Phone/ Email	Est. Dollar Amt	Currently DBE Certified?

Continue on back if needed

[1] A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

[2] Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

Bidder Certification for Advertisement Regarding Subcontracting Opportunities for Disadvantaged Businesses

I, _____, do hereby certify that:
(Name)

1. I am _____ of the _____ and have authority to execute this certification on behalf of the firm;
Name Firm

2. This firm did not receive any proposals from disadvantaged businesses, prior to bid opening _____.
Date of Bid Opening

Name of Firm _____

Signature _____

Title

_____

Date

_____

Corporate Seal (where appropriate)

Nondiscrimination Clause

All Prime Contracts (Including A & E Agreements) must include the following:

The contractor (engineer) shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The contractor shall carry out applicable requirements of 40 CFR Part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. Failure by the contractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies.

Note: This clause is included in the example agreement on Page 23, Item 7. It must be included in all engineering contracts and all prime construction contracts.

Bidder Certification Regarding the Use of American Iron and Steel Products

_____, do hereby certify that:
Name

1. I am_____(title) of the _____(company, partnership, etc.) and have authority to execute this certification on behalf of the firm.

2. This firm is aware that all iron and steel products used for this project must be produced in the United States per Section 436 (a) – (f) of the Consolidated Appropriations Act, 2014.

3. This firm is aware that the use of American iron and steel products applies to all projects for the construction, alteration, maintenance, or repair of publically owned treatment works (POTW) or public water systems.

4. This firm understands the term "iron and steel products" refers to the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.

5. I am aware that this requirement applies to all portions of the project that are subcontracted.

Name of Firm_____

Signature_____

Title
_____

Date
_____

Corporate Seal (where appropriate)

Use of American Iron and Steel

Sec. 436. (a)(1) None of the funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j-12) shall be used for a project for the construction, alteration, maintenance, or repair of a public water system or treatment works unless all of the iron and steel products used in the project are produced in the United States.
(2) In this section, the term `iron and steel products' means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.
(b) Subsection (a) shall not apply in any case or category of cases in which the Administrator of the Environmental Protection Agency (in this section referred to as the `Administrator') finds that--

(1) applying subsection (a) would be inconsistent with the public interest;
(2) iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or
(3) inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

(c) If the Administrator receives a request for a waiver under this section, the Administrator shall make available to the public on an informal basis a copy of the request and information available to the Administrator concerning the request, and shall allow for informal public input on the request for at least 15 days prior to making a finding based on the request. The Administrator shall make the request and accompanying information available by electronic means, including on the official public Internet Web site of the Environmental Protection Agency.
(d) This section shall be applied in a manner consistent with United States obligations under international agreements.
(e) The Administrator may retain up to 0.25 percent of the funds appropriated in this Act for the Clean and Drinking Water State Revolving Funds for carrying out the provisions described in subsection (a)(1) for management and oversight of the requirements of this section.
(f) This section does not apply with respect to a project if a State agency approves the engineering plans and specifications for the project, in that agency's capacity to approve such plans and specifications prior to a project requesting bids, prior to the date of the enactment of this Act.

SECTION 00451

CONTRACTOR'S QUALIFICATION

All questions must be answered and the data given must be clear and comprehensive. If necessary, questions may be answered on separate attached sheets. Qualification statements made herein shall reflect the BIDDER (Individual, partnership or corporation) proposing to enter into contract for the work and not prior business experience of the BIDDER. The BIDDER may submit any additional information he desires.

1. Name of BIDDER. _____

2. Permanent main office address, including City, State and Zip Code. Also list telephone and fax numbers.

   _____

   _____

   Telephone: _____ Fax: _____

3. When organized. _____

4. If a corporation, where incorporated. _____

5. How many years have you been engaged in the construction of municipal improvements of the same type contemplated herein under your present firm or trade name? _____

   How many years have you been engaged in the construction of municipal improvements of the same type contemplated herein under a past firm or trade name? _____

6. Contracts already on hand for the proposed construction period: (Schedule these showing gross amount of each contract and the appropriate anticipated dates of start and completion).

Contract Name & Description	Gross Amount	Start Date	Comp. Date

7. General character of work performed by your company. _____

   _____

   _____

   _____

   _____

   _____

   _____

8. Have you ever failed to complete any work awarded to you? _____

   If so, where and why? _____

   _____

   _____

   _____

   _____

   _____

   _____

9. Have you ever defaulted on a contract? _____

If so, where and why? Give full details. _____

_____

_____

_____

_____

_____

_____

10. List major contracts recently completed by you in the past two (2) years stating approximate gross value for each, and the month and year completed and a reference with telephone number who may be contacted for each. (OWNER or ENGINEER). List major components for each project.

Project No. 1 _____
Owner _____
Address _____
Telephone: (___) _____ Fax: (___) _____
Contact Person _____
Engineer _____
Address _____
Telephone: (___) _____ Fax: (___) _____
Completion Date _____
Approximate gross value _____
Major project components _____

Project No. 2 _____
Owner _____
Address _____
Telephone: (___) _____ Fax: (___) _____
Contact Person _____
Engineer _____
Address _____
Telephone: (___) _____ Fax: (___) _____
Completion Date _____
Approximate gross value _____
Major project components _____

Project No. 3 _____
Owner _____
Address _____
Telephone: (___) _____ Fax: (___) _____
Contact Person _____
Engineer _____
Address _____
Telephone: (___) _____ Fax: (___) _____
Completion Date _____
Approximate gross value _____
Major project components _____

Project No. 4 _____
Owner _____
Address _____
Telephone: (___) _____ Fax: (___) _____
Contact Person _____
Engineer _____
Address _____
Telephone: (___) _____ Fax: (___) _____
Completion Date _____
Approximate gross value _____
Major project components _____

Project No. 5 _____
Owner _____
Address _____
Telephone: ( ) _____ Fax: ( ) _____
Contact Person _____
Engineer _____
Address _____
Telephone: ( ) _____ Fax: ( ) _____
Completion Date _____
Approximate gross value _____
Major project components _____

11. List your major equipment available for this contract.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

12. Attach description of experience in construction work similar in importance to this project Bidders must demonstrate through examples past project experience that they have successfully bid, bonded, contracted for and completed municipal improvements of the same type contemplated herein, as the prime bidder/Contractor under their present business organization.

13. Attach resumes and/or description of background and experience of the principal members of your organization including the officers, project manager, field superintendent(s).

14. Provide the names, address, telephone number and contact for any subconsultants/subcontractors to be used on this project.

Subconsultant/subcontractor No. 1:

Name _____
Address _____
Telephone: ( ) _____ Fax: ( ) _____
Contact Person _____

Subconsultant/subcontractor No. 2:

Name _____
Address _____
Telephone: ( ) _____ Fax: ( ) _____
Contact Person _____

Subconsultant/subcontractor No. 3:

Name _____
Address _____
Telephone: ( ) _____ Fax: ( ) _____
Contact Person _____

Subconsultant/subcontractor No. 4:

Name _____
Address _____
Telephone: ( ) _____ Fax: ( ) _____
Contact Person _____

Subconsultant/subcontractor No. 5:

Name _____
Address _____
Telephone: ( ) _____ Fax: ( ) _____
Contact Person _____

Subconsultant/subcontractor No. 6:

Name _____
Address _____
Telephone: ( ) _____ Fax: ( ) _____
Contact Person _____

15. Credit available. _____

16. Give bank or financial reference including name and phone number of individual who can discuss your line of credit.

Institution Name _____
Address _____
Telephone: ( ) _____ Fax: ( ) _____
Contact Person _____

Institution Name _____
Address _____
Telephone: ( ) _____ Fax: ( ) _____
Contact Person _____

17. Will you, upon request, fill out a detailed financial statement and furnish any other information that may be required by the Owner? _____

18. (a) Have you ever been a party to or otherwise involved in any action or legal proceeding involving matters related to race, color, nationality or religion? _____

If so, give full details. _____

(b) Have you ever been accused of discrimination based upon race, color, nationality, or religion in any action or legal proceedings, including any proceeding related to any Federal Agent? _____

_____

If so, give full details. _____

_____

_____

_____

_____

_____

_____

_____

19. Give proposed bonding company, agent's name and phone number.

Bonding Company Name _____
Agent's Name _____
Address _____

_____
Telephone: (____) _____ Fax: (____) _____

20. The undersigned hereby authorizes and requests any person, or firm or corporation to furnish any information requested by the Owner in verification of the recitals comprising this Contractor's Qualification.

Contractor's Registration Number: _____

DATED at _____ this _____ day of _____, 20____.

_____
(Name of Bidder)

By_____
(Signature of authorized person)

_____
(Name of authorized person)

Title _____

State of _____)

) SS

County of _____)

_____, being duly sworn, deposes and says that he is

_____, of _____
(Name of Organization)

and that the answers to the foregoing questions and all statements therein contained are true and correct.

Subscribed and sworn to before this _____ day of _____, 20____.

_____
(Notary Public)

My commission expires on the _____ day of _____, 20____.

END OF DOCUMENT 00451

APPLICATION AND CERTIFICATE FOR PAYMENT
(PAY ESTIMATE)

PROJECT: _____

PROJECT NO: _____

_____

CONTRACTOR: _____

OWNER: _____

APPLICATION NO: _____

APPLICATION DATE: _____

PERIOD FROM:

ORIGINAL CONTRACT SUM: _____

NET CHANGE BY CHANGE ORDERS: _____

CONTRACT SUM TO DATE: _____

TOTAL COMPLETED & STORED TO DATE: _____

RETAINAGE 10%: _____

TOTAL EARNED LESS RETAINAGE: _____

LESS PREVIOUS CERTIFICATES OF PAYMENT: _____

CURRENT PAYMENT DUE: _____

CONTRACT TIME LIMIT DATE: _____

ORDER NO.	DATE APPROVED	ADDITIONS	DEDUCTIONS
	TOTALS		

NET CHANGE BY CHANGE ORDERS: _____

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

In accordance with the Contract Documents, based on site observations and the data comprising this application, the Engineer certifies to the Owner that to the best of the Engineer's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED OF $

(Attach explanation if amount certified differs from the amount applied for. Initial all figures on this Application and on the Continuation Sheet that are changed to conform to the amount certified.)

CONTRACTOR:

BY: _____

DATE:

_____

OWNER:

BY: _____

ENGINEER:

BY: _____

MECO ENGINEERING COMPANY, INC.
ENGINEERS * SURVEYORS

3120 HIGHWAY W
HANNIBAL, MISSOURI 63401 (573) 221-4048

GENERAL CONDITIONS
INDEX

1. Definitions
2. Execution, Correlation and Intent of Documents
3. Notice and Service Thereof
4. Copies of Drawings Furnished
5. Order of Completion
6. Contractor's Understanding
7. Materials, Services and Facilities
8. "Or Equal" Clause
9. Royalties and Patents
10. Surveys, Permits and Regulations
11. Protection of Work and Property
12. Inspection and Examination of the Work
13. Removal of Improper Material
14. Superintendence; Supervision
15. Changes in the Work
16. Extras
17. Claims for Extra Cost
18. Deductions for Uncorrected Work
19. Delays and Extension of Time
20. Suspension of Work
21. Owner's Right to do Work
22. Right of the Owner to Terminate Contract
23. Contractor's Right to Terminate Contract
24. Removal of Equipment
25. Use of Completed Portions
26. Owner's Right to Withhold Certain Amounts and Make
27. Indemnity
28. Damages
29. Liens
30. Assignments
31. Rights of Various Interests
32. Other Contracts
33. Approval of Subcontracts
34. Points and Instructions
35. Engineer's Status
36. Engineer's Decision
37. Review of Decisions
38. Lands for Work
39. Cleaning Up
40. Contractor's Liability Insurance
41. Draw Requests
42. Shop Drawings
43. Unit Prices
44. Miscellaneous

1.00 DEFINITIONS:

A. The Contract shall be deemed to incorporate all information contained in the Contract Documents. The Contract Documents consist of the Information for Bidders, the Proposal, the signed Contract Agreement, the Performance Bond, if required, the General Conditions, the Special Conditions, Drawings and Specifications, including all modifications thereof incorporated in the documents before their execution. These form the Contract.

B. Addenda to the Contract Documents consist of revised and supplemental drawings; written instructions in the Form of Bulletin, Addendum, Change Order (which may be called "Change Order", "Field Work Order" or "Letter of Instruction"), when issued in accordance with provisions of the Contract Documents all of which shall have the same value and effect as, and take precedence over, the original or previous like document, instructions, etc.

C. The Owner, the Contractor, and the Engineer, are those mentioned as such in the Contract Agreement. They are treated throughout the Contract Documents as if each were of the singular number and masculine gender.

D. Wherever in this Contract the word Engineer is used, it shall be understood as referring to the Engineer of the Owner, acting personally or through an assistance duly authorized in writing for such act by the Engineer.

E. The term subcontractor, as employed herein, includes only those having a direct contract with the Contractor and it includes one who furnishes material worked to a special design according to the drawings or specifications of this work, but does not include one who merely furnishes materials not so worked.

F. The term "work" of the Contractor or subcontractor includes labor, materials or both, equipment, transportation, or other facilities necessary to complete the Contract.

G. Wherever the words "approved (by)", "satisfactory to", "acceptable", "acceptance", "as directed", "submitted to", "inspected by", or similar phrases are used in these General Conditions, they shall be understood to mean that work material or items referred to shall be submitted to, approved by, as directed by, accepted by, etc., the Engineer in writing.

H. Notice or "giving of notice" shall be deemed to mean written notice.

I. Shop Drawings are detailed drawings prepared by Contractor, subcontractors and/or manufacturers showing specific method of construction, installation, location, quantity, finish, dimensions, performance characteristics, and that in the case of operating items; all other data necessary and/or requested to indicate qualitative values of the time and includes all materials furnished to specific, unique or singular size, shape, performance characteristics, etc. of this project and may include standard production items at the discretion of the Engineer.

J. Provide shall infer, imply and require "to furnish and install, ready for use or further construction".

2.00 EXECUTION, CORRELATION AND INTENT OF DOCUMENTS:

A. The Contract Documents are complimentary, and what is called for by anyone shall be binding as if called for by all. The intention of the documents is to include all labor, equipment and transportation necessary for the proper execution of the work. It is not intended, however, that materials or work not covered by or properly inferable from any heading, branch, class or trade in the specifications shall be supplied unless distinctly so noted on the drawings or in the contract. Materials or work described in words, which so applied, have a well-known technical or trade meaning shall be held to refer to such recognized standards.

3.00 NOTICE AND SERVICE THEREOF:

A. Where, in any of the Contract Documents, there is any provision with respect to the giving of any notice, such notice shall be deemed to have been given (as to the Owner) when written notice shall be delivered to the Engineer or the Owner, or shall have been placed in the United States mails, addressed to the Engineer, at the place where the bids or proposal for the Contract were opened; as to the Contractor, when a written notice shall be delivered to the chief representative of the Contractor at the site of the project to be constructed under the Contract, or by mailing such written notice in the United States mails, addressed to the Contractor at the

place stated in the papers prepared by him to accompany his proposal as the address of his permanent place of business; as to the surety on the Performance Bond when a written notice shall have been placed in the United States mails, addressed to the surety at the home office of such surety.

4.00 COPIES OF DRAWINGS FURNISHED:

A. The owner will furnish to the Contractor, free of charge, two (2) copies of drawings and specifications. Additional copies may be obtained at Contractor's expense.

B. The Contractor shall keep one copy of all drawings and specifications on the work, in good order, available to the Engineer and to his representatives. At the completion of the contract work, the Contractor shall furnish to the Engineer, one marked copy of all drawings showing as-built conditions.

5.00 ORDER OF COMPLETION:

A. The Contractor shall complete any portion or portions of the work in such order of time as the Engineer may declare necessary by reason of an emergency.

6.00 CONTRACTOR'S UNDERSTANDING:

A. It is understood and agreed that the Contractor has, by careful examination, satisfied himself as to the nature and location of the work, the conformation of the ground, the character, quality and quantity of the materials to be encountered, the character of the equipment and facilities needed preliminary to and during the prosecution of the work, the general and local conditions, and all other matters which can in any way affect the work under this Contract.

B. No official, officer or agent of the Owner is authorized to make any representations as to the materials or workmanship involved, or the conditions to be encountered, and the Contractor agrees that no such statement or the evidence of any document or plan, not a part of this Contract, shall constitute any grounds for claim as to conditions encountered. No verbal agreement or conversation with any officer, agent or employee of the Owner, either before or after the execution of this Contract, shall affect or modify any of the terms or obligations herein contained.

C. It is understood and agreed that the Contractor has informed himself fully as to the conditions relating to construction and labor under which the work will be performed, and agrees as far as possible to employ such methods and means in the carrying out of the work as will not cause any interruption or interference with any other contractor.

7.00 MATERIALS, SERVICE AND FACILITIES:

A. It is understood that except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for labor, tools, equipment, water, light, power, transportation, superintendence, temporary construction of every nature, and all other services and facilities of every nature whatsoever necessary to execute, complete and deliver the work within the specified time. Materials shown to be furnished by the Owner will be provided by the Owner and made available to the Contractor as needed. All other ancillary materials shall be provided by the contractor.

B. Any work necessary to be performed after regular working hours, on Sundays or legal holidays shall be performed without additional expense to the Owner.

8.00 "OR EQUAL" CLAUSE:

A. Whenever in any of the Contract Documents any article, appliance, device or material is designated by the name of the manufacturer or vendor, or by any proprietary name and such name is not followed by the words "or equal", it shall be deemed that such words "or equal" do follow such designation, unless the context clearly required a contrary construction. Any article or material equaling the standards fixed may be used in place of that specifically mentioned by the specifications, providing that the material proposed is first submitted to and approved by the Owner or his authorized representative.

9.00 ROYALTIES AND PATENTS:

A. The Contractor shall hold and save the Owner and his officers, agents, servants and employees harmless from liability of any nature or kind, including cost and expenses, for, or on account of, any patented or unpatented invention, process, article or appliance manufactured or used in the performance of the Contract, including its use by the Owner, unless otherwise specifically stipulated in the Contract Documents.

10.00 SURVEYS, PERMITS AND REGULATIONS:

A. The Owner shall make all property surveys unless otherwise provided. Permits and licenses of a temporary nature necessary for the prosecution of the work shall be secured and paid for by the Contractor.

B. The Owner shall give all notice and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified. The Contractor is required to observe all laws and ordinances relating to the obstructing of streets, maintaining signals, keeping open passageways and protecting them where exposed to danger, and all general ordinances affecting him or his employees or his work hereunder in his relations to the Owner or any person, and also generally to obey all laws and ordinances controlling or limiting the Contractor while engaged in the prosecution of the work under this Contract. If the Contractor observes that the drawings and specifications are at variance with laws and regulations, he shall promptly notify the Engineer in writing, and any necessary changes shall be adjusted as provided in the Contract for changes in the work. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, rules or regulations, and without such notice to the Engineer, he shall bear all costs arising therefrom.

11.00 PROTECTION OF WORK AND PROPERTY:

A. The Contractor must protect and support all water and gas pipes or other conduits, and all buildings, walls, fences, or other properties which are liable to be damaged during the execution of his work. He shall take all reasonable proper precautions to protect persons, animals and vehicles or the public from injury and wherever necessary, shall erect and maintain a fence or railing around any excavation, and place a sufficient number of red lights about the work and keep them burning from twilight until sunrise; and shall employ one or more watchmen as an additional security whenever they are needed. He must, as far as practicable and consistent with good construction, permit access to private and public property and leave fire hydrants and catch basins free from encumbrances.

12.00 INSPECTION AND EXAMINATION OF THE WORK:

A. The Engineer and his authorized assistants, as well as all inspectors and other authorized personnel of any public agency under whose jurisdiction the work is being performed, shall have free access to the work at all times for inspection purposes, and shall be furnished by the Contractor, with facilities for ascertaining whether the work being performed or which has been completed is in accordance with the requirement of the drawings, specifications and contract to the extent of uncovering, testing or removing portions of finished work.

B. Duly authorized inspectors acting in behalf of the Engineer and any public agency under whose jurisdiction the work is being performed, who shall perform their duties under the direction of the Engineer, will be assigned to the project or any part thereof. The presence of an inspector shall in no way lessen the responsibility of the Contractor. In case any dispute arises between the Contractor and the Inspector as to materials furnished or the manner of performing the work, the inspector shall have authority to reject materials or suspend the work until the question at issue can be referred to and decided by the Engineer. The inspector is not authorized to revoke, alter, enlarge, relax or release any requirements of these specifications, nor to approve or accept any portion of the work or to issue instructions contrary to the drawings and specifications.

C. When any material not conforming to the requirements of the specifications and drawings has been delivered upon the project or incorporated in the work, or any work performed is of inferior quality, such material or work shall be considered as defective and shall be removed and renewed or made satisfactory, as directed by the Engineer, at the expense of the Contractor.

D. All materials shall be subject to inspection, examination and test by the Engineer at any and all times during manufacture, and at any and all placed where such manufacture is being carried on. The right is reserved to reject defective materials during manufacture or before they have been incorporated into the work. If the

Contractor fails to replace defective work or rejected materials, the Owner may replace such materials or correct such defective work and charge the cost thereof to the Contractor, or may terminate the right of the Contractor to proceed under Article 22 of the General Conditions.

13.00 REMOVAL OF IMPROPER MATERIAL:

A. All materials to be provided by the Contractor shall be of the best quality, and if the Contractor shall bring or cause to be brought on the work, materials which do not conform to the requirements of this Contract, the Engineer shall order the same to be removed forthwith, and in case of the neglect or refusal of the Contractor or those employed by him to remove such materials, to cause the same to be removed at the expense of the Contractor and to deduct the cost of such removal and all other expenses incident thereto from the amount which may be due to the Contractor on this Contract; and, in case of the violation of this provision the amount of costs and expenses shall be deducted by the Engineer from the final, or any other estimate of the amount due to the Contractor on this Contract.

14.00 SUPERINTENDENCE - SUPERVISION:

A. The Contractor must at all times have an authorized representative on the work to whom orders can be given, this representative to have full authority to carry out all orders given by the Engineer, and shall keep on the work, during its progress, a competent superintendent and any necessary assistance, all satisfactory to the Engineer.

B. The superintendent shall represent the Contractor in his absence and all directions given to him shall be as finding as if given to the Contractor. Directions shall be confirmed in writing upon written request in each case. The Contractor shall give efficient supervision to the work, using his best skill and attention.

C. During the construction and maintenance period of the work of this Contract, any order given by the Engineer or his representatives to the manager, superintendent or foreman of the Contractor in the absence of the Contractor, shall have the same force and effect as if given to the Contractor.

D. If the Contractor, in the course of the work, finds any discrepancy between the plans and the physical conditions of the locality, or any errors or omissions in the plans, it shall be his duty to immediately inform the Engineer in writing, and the Engineer shall promptly verify the same. Any work after such discovery, until authorized, will be done at the Contractor's risk.

E. Neither party shall employ or hire any employee of the other party without the other party's consent.

15.00 CHANGES IN THE WORK:

A. The Owner, without invalidating the Contract, may order extra work or make changes by altering, adding to, or deducting from the work, the Contract Sum being adjusted accordingly. All such work shall be executed under the Conditions of the original Contract except that any claim for extension of time caused thereby shall be adjusted at the time of ordering such change.

B. In giving instructions, the Engineer shall have authority to make minor changes in the work, not involving extra cost, and not inconsistent with the purposes of the work, but otherwise, except in an emergency endangering life or property, no extra work or change shall be made unless in pursuit of a written order by the Engineer, and no claim for an addition to the Contract Sum shall be valid unless so ordered.

C. The value of any such work or change shall be determined in one or more of the following ways:

1. By estimate and acceptance in a lump sum.

2. By unit prices agreed to by both parties.

3. By cost and percentage or by cost and a fixed fee.

D. If none of the above methods is agreed upon, the Contractor, provided he receives an order as above, shall proceed with the work. In such case and also under case 3, he shall keep and present in such form as the

Engineer may direct, a correct account of the net cost of labor and materials, together with vouchers. In any case, the Engineer shall certify to the amount including reasonable allowance for overhead and profit due to the Contractor. In no case shall the allowance for overhead and profit exceed fifteen (15) percent of the actual cost of the work. Pending final determination of value payments on account of changes shall be made on the Engineer's estimate.

16.00 EXTRA:

A. Except as otherwise herein provided, no charge for any extra work or material will be allowed unless the same has been ordered in writing by the Owner and the price stated in such order.

17.00 CLAIMS FOR EXTRA COST:

A. No claims for additional payments above the Contract Sum other than such amounts as are authorized for extra work ordered in accordance with the aforesaid paragraphs designated "extras" or "Changes in the Work" will be considered or allowed.

18.00 DEDUCTIONS FOR UNCORRECTED WORK:

A. If the Engineer deems it inexpedient to correct work injured or not in accordance with the Contract, an equitable deduction from the Contract Sum shall be made therefore.

19.00 DELAYS AND EXTENSION OF TIME:

A. If the Contractor is delayed at any time in the progress of the work by any act or neglect of the Owner or of his employees, or by any other contractor employed by the Owner, or by changes ordered in the work, or by strikes, lockouts, fire, unusual delay in transportation, unavoidable casualties or any causes beyond the Contractor's control, or by any causes which the Engineer shall decide to justify the delay, then the time of completion shall be extended for such reasonable time as the Owner may decide.

B. No such extension shall be made for delay occurring more than seven (7) days before claim therefor is made in writing to the Engineer. In the case of continuing cause of delay, only one (1) claim is necessary.

C. If no schedule or agreement stating the dates upon which drawings shall be furnished is made, then no claim for delay shall be allowed on account of failure to furnish drawings until two (2) weeks after demand for such drawings and not then unless such claims be reasonable.

20.00 SUSPENSION OF WORK:

A. The Owner may at any time suspend work or any part thereof, by giving five (5) days notice to the Contractor in writing. The work shall be resumed by the Contractor within ten (10) days after the date fixed in the written notice from the Owner to the Contractor to do so. The Owner shall reimburse the Contractor for expense incurred by the Contractor in connection with the work under this Contract as a result of such suspension, unless such suspension is ordered to secure compliance with the terms of this Contract.

21.00 OWNER'S RIGHT TO DO WORK:

A. In case the Contractor fails to prosecute any portion of the work embraced in this agreement at a rate of progress satisfactory to the Engineer, or in a manner not in compliance with the specifications or drawings, thereupon the Engineer shall, in writing, notify the Contractor to remove all cause of complaint within a time specified in such notice. If the Contractor fails to do so, the Owner may proceed to complete such portion of the work in such a manner as he may determine. All cost of such work shall be deducted from any money due, or which may become due the Contractor under this Contract.

22.00 RIGHT OF THE OWNER TO TERMINATE CONTRACT:

A. If the Contractor should be adjudged a bankrupt, or if any petition in bankruptcy or any proceedings under the provision of the Bankruptcy Act of the U.S. as Amended, are filed by or against the Contractor, or if he should

make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials, or if he should fail to make prompt payment to subcontractors or for materials or labor, or persistently disregard laws, ordinances or the instruction of the Engineer, or should cease operations under this Contract at any time for the space of ten (10) days, or otherwise be guilty of a substantial violation of any provision of the Contract, and should Contractor fail to implement the necessary remedial measures within ten (10) days of written notice from Engineer to Contractor and Surety to do so and thereafter diligently prosecute such measures, then the Owner may without prejudice to any other right or remedy, terminate the employment of the Contractor and take possession of the site and of all materials, equipment, tools, construction equipment and machinery owned by the Contractor, and the Owner may finish the Contract by whatever method it may deem expedient. In such cases, the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the Contract Sum shall exceed the expense of finishing the work, including compensation for additional managerial and administrative services, such excess shall be paid to the Contractor. If such expense shall exceed such unpaid balance, the Contractor and surety shall pay the difference to the Owner. The expense incurred through the Contractor's default shall be certified by the Engineer.

23.00 CONTRACTOR'S RIGHT TO TERMINATE CONTRACT:

A. If the work should be stopped under an order of any court or other public authority for a period of three (3) months, through no act or fault of the Contractor or of anyone employed by him, then the Contractor may, upon ten (10) days written notice to the owner and the Engineer, terminate his contract and recover from the Owner payment for all work executed and any loss sustained upon any plant or materials and reasonable profit.

24.00 REMOVAL OF EQUIPMENT:

A. In the case of annulment of this Contract before completion from any cause whatever, the Contractor, if notified to do so by the Owner, shall promptly remove any part or all of his equipment and supplies from the property of the Owner, failing which the Owner shall have the right to remove such equipment and supplies at the expense of the Contractor.

25.00 USE OF COMPLETED PORTIONS:

A. The Owner shall have the right to take possession of and use any completed or partially completed portions of the work, notwithstanding the time for completing the entire work or such portions which may not have expired; but such taking possession and use shall not be deemed an acceptance of any work not completed in accordance with the Contract Documents. If such prior use increases the cost of or delays the work, the Contractor shall be entitled to such extra compensation, or extension of time, or both, as the Engineer may determine.

26.00 OWNER'S RIGHT TO WITHHOLD CERTAIN AMOUNTS & MAKE APPLICATION THEREOF:

A. The Owner may withhold from payment to the Contractor, such an amount or amounts as may be necessary to cover the following:

1. Payments that may be earned or due for just claims for labor or materials furnished in and about the work.

2. For defective work not remedied.

3. For failure of the Contractor to make proper payments to his subcontractor.

4. Damage to another contractor.

5. Reasonable evidence that work cannot be completed for the unpaid balance of the contract sum.

6. Persistent failure to carry out the work in accordance with the Contract Documents.

7. Liquidated damages incurred by failure to meet time schedule.

B. The Owner shall have the right to disburse and shall have the right to act as agent for the Contractor in disbursing such funds as have been withheld pursuant to this paragraph to the party or parties who are entitled to payment therefrom. The Owner shall render to the Contractor a proper accounting of all such funds disbursed in behalf of the Contractor.

27.00 INDEMNITY:

A. The Contractor shall indemnify and save harmless the Owner and the Engineer from and against all losses, damages, claims, liens and expenses arising out of or connected with the work, including liability imposed by law and/or custom upon the Owner, whether or not it be claimed or proven that there was negligence or breach of statutory duty, or both, upon the Owner, and in any case, the Contractor shall, at request of the Owner, undertake to defend any and all suits and to investigate and defend any and all claims.

28.00 DAMAGES:

A. Should the Contractor be of the opinion at any time that he has sustained damages under this Contract, for which he should be compensated, or has been required to perform extra work not ordered in writing by the Engineer, he shall, with seven (7) days after sustaining such damage or doing such extra work, make a written statement to the Engineer, of the nature of the damage claimed or of the extra work performed and not ordered. The Engineer shall thereupon render a decision in the matter, which decision shall be subject to review under the provisions of Article 37, but if such claim shall not have been presented within the seven (7) days above mentioned, but shall be presented at some time later, then the Engineer's decision in the matter shall be final and the Contractor shall not be entitled to have such claims reviewed.

29.00 LIENS:

A. Contractor agrees to make prompt payment to all subcontractors which includes laborers, material men, and all others entitled to payment on account of the Work and to keep the Work and the premises free and clear of any and all liens and claims of lien of subcontractors which includes laborers, material men, and any others who under law are entitled to liens against the Work, the Premises or any part of the premises with respect to the Work. Notwithstanding anything to the contrary contained in this Contract, if any such lien shall be filed and/or recorded (or if there is reason to believe that any such lien may be filed and/or recorded) or if Contractor fails to promptly pay all subcontractors which includes laborers, material men, or any person or entity entitled to payment on account of the Work, or fails to remedy defective work, or if there is reasonable doubt that the Contract can be completed for the balance of the Contract Sum then unpaid, or there are damage claims by any subcontractor against Contractor at any time during the progress of the Work, the Owner may withhold, or, on account of subsequently discovered evidence, nullify the whole or part of any payment due the Contractor to such extent as may be necessary in the reasonable opinion of Owner to protect itself from loss, unless and until Contractor shall furnish satisfactory evidence that the indebtedness and/or the lien in respect thereof, if any, has been satisfied, discharged and released; and if such evidence is not furnished by Contractor within a period of five (5) days after demand therefor, Owner at its option, but without being required to do so, may discharge such indebtedness and deduct from the Contract Sum, the amount required therefor, together with any and all losses, costs, damages and attorneys' fees suffered or incurred by Owner.

B. When the above grounds are removed, payment shall be made for amounts withheld because of them.

C. Contractor and Owner both agree that any amount of money withheld by Owner from Contractor under the provisions of this Article 29 and 26 is in addition to the normal ten percent (10%) of the Contract Sum retained by Owner until final payment.

D. Neither the final payment nor any part of the retained percentage shall become due until the Contractor shall deliver to the Owner a complete release of all liens arising out of this Contract, or receipts in full in lieu thereof. In either case, an affidavit shall be furnished to the Owner stating that so far as he has knowledge or information, the releases and receipts include all the labor and material for which a lien could be filed. However, the Contractor may, if any subcontractor refuses to furnish a release or receipt in full, furnish a bond

satisfactory to the Engineer to indemnify the Owner against any lien. If any lien remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all money payments that the latter may be compelled to pay in discharging such a lien, including all costs and a reasonable attorney's fee.

30.00 ASSIGNMENTS:

A. The Contractor shall not assign the whole or any part of this Contract or any monies due or to become due hereunder without written consent of the Owner. In case the Contractor assigns all or any part of any monies due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due to the Contractor shall be subject to prior liens of all persons, firms and corporations for services rendered, or materials supplied for the performance of the work called for in this Contract.

31.00 RIGHTS OF VARIOUS INTERESTS:

A. Wherever work being done by the Owner's forces or by other contractors is contiguous to work covered by this Contract, the respective rights of the various interests involved shall be established by the Engineer.

32.00 OTHER CONTRACTS:

A. The Owner reserves the right to let other contracts in connection with this work. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work, and shall properly connect and coordinate this work with theirs.

B. If any part of the Contractor's work depends, for proper execution or results upon the work of any other contractor, the Contractor shall inspect and promptly report to the Engineer any defects in such work that render it unsuitable for such proper execution and results.

C. To ensure the proper execution of his subsequent work, the Contractor shall measure work already in place and shall at once report to the Engineer any discrepancy between the executed work and the drawings.

33.00 APPROVAL OF SUBCONTRACTS:

A. The Contractor shall, within ten (10) days after the acceptance of his proposal, furnish the Engineer in writing the names of the subcontractors proposed for the work and shall not employ any that the Engineer may, within a reasonable time, object to as incompetent and unfit.

B. If requested by either the Owner or the Engineer, the Contractor shall also furnish information with respect to past performances and financial status of the actual or intended subcontractors.

C. The Contractor shall sublet those portions of the Work which, under normal contracting practices, are performed by specialty subcontractors; provided, however, that if the Contractor can show that the specialty work in question has been customarily performed by his own organization, the Contractor shall be permitted to do so.

D. The Contractor shall incorporate in all of his subcontracts with subcontractors the following provisions:

1. "The subcontractor shall be bound to the Contractor by the terms of the Contract Documents between the Owner and Contractor, and shall assume toward the Contractor all obligations and responsibilities which the Contractor, by those documents, assumes toward the Owner, and shall have the benefit of all rights, remedies and redress against the Contractor which the Contractor, by those Contract Documents, has against the Owner, insofar as applicable to this Subcontract, provided that where any provision of the Contract Documents between the Owner and the Contractor is inconsistent with any provisions of this Subcontract, the provisions of the Contract Documents between the Owner and the Contractor shall govern".

2. "The Contractor shall be bound to the Subcontractor by the terms of the Contract Documents between the Owner and the Contractor shall assume toward the Subcontractor all obligations and

responsibilities that the Owner, by those Contract Documents, assumes toward the Contractor, and shall have the benefit of all rights, remedies and redress against the Subcontractor which the Owner, by those documents, has against the Contractor, insofar as applicable to this Subcontract, provided that where any provision of the Contract Documents between the Owner and the Contractor is inconsistent with any provision of this Subcontract, the provisions of the Contract Documents between the Owner and the Contractor shall govern".

E. Contractor is liable to Owner for the full, complete and prompt performance of all contracts between Contractor and any subcontractor relating to the Work and noting in the Contract Documents shall infer or cause in any way a waiver by the Owner of any right against the Contractor because of breach, default, delay, defect, or other acts or omissions for which a subcontractor must also be liable.

F. The contractor shall not sublet more than forty (40) percent of this contract without prior authorization from the Owner.

G. Nothing contained in the Contract Documents shall create any contractual relation between any subcontractor and the Owner.

34.00 POINTS AND INSTRUCTIONS:

A. The Contractor shall provide reasonable and necessary opportunities and facilities for setting control points and making measurements. He shall not proceed until he has made timely demand upon the Engineer for, and has received from him, such control points and instructions as may be necessary as the work progresses. The work shall be done in strict conformity with such points and instructions. The Contractor shall be responsible for all construction measurements.

35.00 ENGINEER'S STATUS:

A. The Engineer shall not have general supervision nor direction of the work. The Owner shall have authority to reject work and materials that do not conform to the Contract, and to decide questions that arise in the execution of the work. The Engineer is not responsible for the means and methods or performance of the work. The Engineer is not responsible for safety practices.

B. It is further agreed by all parties hereto that the Engineer shall in all cases, determine the amount or quantity, or the classification of the several kinds of work or materials, which are to be paid for under this Contract.

36.00 ENGINEER'S DECISION:

A. The Engineer shall decide all questions which may arise relative to the performance of this Contract. All decisions of the Engineer shall, when so requested, be rendered in writing. They shall be final and conclusive in all matters except the financial considerations involved. They shall be final also as to the financial considerations unless within ten (10) days after such decision the Contractor applies in writing to the Owner for a review of such decision.

37.00 REVIEW OF DECISIONS:

A. When an application for review of the Engineer's decision is presented, said Owner shall within fifteen (15) days thereafter, give opportunity for the Contractor to appear before him and the Engineer, and present evidence bearing upon such decision, and any claims for a modification or reversal thereof. Said Owner shall render his decision within fifteen (15) days after such appearance and his decisions shall be final unless the Contractor shall, within fifteen (15) days after receiving the decision, give notice in writing of his intention to file suit in court for final determination of the matter.

38.00 LANDS FOR WORK:

A. The Owner shall provide the lands upon which the work under this Contract is to be done and rights of access to same. Any delay in the furnishing of these lands by the Owner shall be deemed proper cause for an adjustment in the time of completion.

B. The Contractor shall provide, at his own expense and without liability to the Owner, any additional land required for the erection of temporary construction facilities and storage of his material, together with right of access to the same.

39.00 CLEANING UP:

A. The Contractor shall, as directed by the Engineer, remove from the property of the Owner, from all public and private property, at his own expense, all temporary structures, rubbish and waste materials resulting from his operations. This requirement shall not apply to property used for permanent disposal of rubbish or waste materials in accordance with permission of such disposal granted to the Contractor by the property owner.

40.00 CONTRACTOR'S LIABILITY INSURANCE:

A. The Contractor shall secure and maintain such insurance policies as will protect himself, his subcontractors, and unless otherwise specified, the Owner, from claims from bodily injuries, death or property damage which may arise from operations under this Contract, whether such operations be by himself, or by any subcontractor, or anyone employed by them directly or indirectly. The policies shall be for not less than the amounts set forth in the Special Conditions for each class of coverage and shall cover:

1. Workmen's Compensation and Employer's Liability. The Workman's Compensation Policy shall be endorsed to include U.S. Longshoremen and Harbor Workers Coverage.

2. Contractual Liability for breach of Paragraph 27, Page 11.

3. Comprehensive General Liability including coverages for explosion, collapse and underground, there shall be no Demolition Exclusion.

4. Automobile and Truck Public Liability, Bodily Injury and Property Damage, on job site or elsewhere if connected with the subject of the job, arising out of the ownership, maintenance and use of any motor vehicle owned, non-owned or hired.

5. Umbrella Liability.

41.00 DRAW REQUESTS:

A. Owner agrees to make progress payments to Contractor on the Contract Sum as the Work progresses in the following manner:

1. Prior to application for the first progress payment, and as a condition to receiving any payment on account of the Contract Sum, Contractor shall submit to Owner a schedule on a form supplied by the Owner and in substance satisfactory to Owner, setting forth the manner in which the Contract Sum has been allocated to each component part of the Work. The allocation must fairly represent Contractor's direct costs for each component part of the Work. Said schedule shall represent, in its total sum, the Contractor Sum, as adjusted to include any subcontractor work.

2. On or before the tenth day of each month, Contractor shall submit to Owner a statement (hereinafter referred to as a "progress statement") based upon the schedule referred to in Paragraph A-1 of this Article 41, setting forth the percentage of the Work completed including materials and equipment delivered to and stored at the Premises, as of the end of the preceding month. Each Progress Statement and the amount of the progress payment claimed shall be accompanied by lien waivers in a form approved by Owner, governing the entire amount of the progress payment claimed. Owner may require in addition to said lien waivers such affidavits and/or any other evidence which Owner in its sole discretion deems necessary in order to substantiate Contractor's claim. Each Progress Statement submitted must include any claim which Contractor has against Owner other than for partial payment and which arose during the month covered by said Progress Statement or Contractor shall forever be barred from bringing such claims. After reviewing the Progress Statement, owner shall issue a certificate of payment for such amount as is deemed to be properly due to Contractor, or Owner may request that Engineer so review and issue such a certificate of payment. After issuance of such certificate of payment, Owner shall promptly pay to Contractor a sum equal to ninety percent (90%) of the amount shown by said certificate of payment to be properly due to Contractor, after

deducting therefrom the amount of all previous progress payments. Notwithstanding anything to the contrary contained herein, payment equal to ninety percent (90%) of the Contract Sum, or such revised adjusted Contract sum, and no further payment on account of the Contract Sum shall be made to Contractor until the final payment thereof becomes due.

42.00 SHOP DRAWINGS:

A. The Contractor shall check and supply all shop drawings, details and/or schedules prior to submittal to the Engineer, and shall submit such approved shop drawings, schedules and/or details of all portions of the Work of all trades and subcontractors and the connection to other contractors as called for in the specifications or as may be required for the proper execution and correlation of the Work. One (1) legible original and one (1) print of each shop drawing; schedule and/or details shall be submitted to the Engineer for approval. Each drawing shall provide a blank block not less than thirty (30) square inches for the use of the Engineer.

B. The original of each of such drawings, schedule and/or detail will be returned to the Contractor with the Engineer's approval, or with the indication of any changes which he may desire to be made shown thereon. Should changes be indicated, the Contractor shall make any changes required and shall resubmit one (1) transparency and one (1) print of each such drawings, schedule and/or details until he has received the transparency of the submittal in question marked approved by the Engineer. Any work constructed in advance of the approval of the shop drawings, schedules and/or details for such work will be at the risk of the Contractor.

C. The approval for such drawings, schedules and/or details shall not relieve the Contractor from responsibility for deviations from drawings or specifications, nor shall it relieve him from responsibility for errors of any sort in shop drawings, schedules and/or details, nor shall it in any way diminish his obligation to conduct the work in accordance with the Contract Documents.

43.00 UNIT PRICE:

A. The successful bidder for the Contract may be requested to submit in detail to the Owner within 48 hours of such a request a complete list of unit prices. These unit prices shall represent the cost to the Owner of items installed and completely in place and shall include all costs connected with such items including, but not limited to, materials, labor and allowances for supervision and general job expense, overhead and profit for Contractor and all others involved in the Work.

44.00 MISCELLANEOUS:

A. Owner and Contractor mutually agree as follows:

1. All time limits and dates stated in the Contract Documents are of the essence of the Contract.

2. Contractor shall not assign this Contract without the prior written consent of Owner. Contractor shall not assign any monies due or to become due to Contractor hereunder without the prior written consent of Owner. Any such assignment shall be void unless such written consent is obtained.

3. No deviation from the provisions of this Contract, for any reason whatsoever and whether authorized or otherwise, shall be deemed to constitute a precedent or waiver with respect of the handling of any subsequent interpretations of applications of any of the provisions of this Contract.

4. Any notices, bills or other communications which are to be in writing shall be given by sending the same, postage prepaid, certified or registered mail, return receipt requested, and addressed to the party to whom sent at the address or addresses shown for that party at the front of this Contract and shall further be addressed to the attention of such other persons or at such other addresses as Owner or Contractor shall by written notice to the other from time to time designate for that purpose.

5. It is understood and agreed that in each case where a right is reserved hereunder to Owner or its representative, Owner may, if it so elects, delegate the exercise of such right to the Engineer, which delegation must be in writing, subject to such limitations with respect to such right as Owner may make and, if Contractor shall be given written notice of such delegation and limitations, Contractor shall be fully protected in relying upon any action taken by Engineer in the exercise of such right

subject to such limitations.

6. This Contract embodies the full and complete understanding of the parties and supersedes any previous agreements, written or oral, including, without limiting the generality of the foregoing, any letter of intent which may have heretofore been given to Contractor by Owner or Owner's authorized representatives; and his Contract cannot be altered, changed, modified, or added to except in writing signed by the duly authorized officers of Owner and Contractor or except pursuant to the provisions of this Contract.

7. This Contract shall insure to the benefit of and shall be finding upon the successors and assigns of Owner, and upon the permitted assigns (and, if applicable, the heirs and personal representatives) of Contractor.

8. Words denoting the singular also include the plural and vice-versa and gender shall be read to agree with the persons or party applicable where the context so requires.

9. The remainder of this Contract will not be voided by the invalidity of one or more of the terms of this Contract.

10. The Contract shall be governed by the law of the place where the Work is located.

11. The index or table of contents, as the case may be, and captions of the various Articles of the various Contract Documents are inserted only as a matter of convenience and for reference. They do not define, limit or describe the scope or intent of the various Contract Documents and they shall not affect the interpretation hereof.

12. Nothing contained in the Contract Documents shall create any contractual relationships between the Owner or the Engineer and any Subcontractor or between the Owner and Engineer.

13. The right of assignment of this Contract shall rest solely with the Owner.

14. The Contractor shall pay all royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and shall indemnify and hold the Owner harmless from loss on account thereof.

15. A waiver of any default or breach of Owner, Contractor or any subcontractor must be in writing and no such waiver shall be implied from any omission by any of them to take any action with respect to such default or breach. No express written waiver of any default or breach shall affect any default or breach or cover any period of time other than the default or breach and period of time specified in such express waiver. One or more written waivers of any default or breach in the performance of any provision of this Contract shall not be deemed to be a waiver of any subsequent default or breach in the performance of the same provisions or any other term or provision contained herein. The consent or approval by Owner to or of any act or request by the Contractor or any subcontractor requiring approval to or of any subsequent similar acts or requests. The rights and remedies given to Owner by this Contract shall be deemed to be cumulative and no one of such rights and remedies shall be exclusive of any of the others, or of any other right or remedy at law or in equity which Owner might otherwise have by virtue of a default or breach under this Contract, and the exercise of one such right or remedy by Owner shall not impair Owner's standing to exercise any other right or remedy.

16. The intent of the drawings and specifications is that the contractor shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the work in accordance with the contract documents and all incidental work necessary to complete the project in an acceptable manner, ready for use, occupancy, or operation by the owner.

    In case of conflict between the drawings and specifications, the specifications shall govern. Figure dimensions on the drawings shall govern over scale dimensions, and detailed drawings shall govern over general drawings.

Any discrepancies found between the drawings and specifications and site conditions or any inconsistencies or ambiguities in the drawings or specifications shall be immediately reported to the engineer in writing, who shall promptly correct such inconsistencies or ambiguities in writing. Work done by the contractor after his discovery of discrepancies, inconsistencies or ambiguities shall be done at the contractor's risk.

END OF SECTION 00700

Section 00800

SPECIAL CONDITIONS

Sanitary Regulations

Adequate sanitary conveniences, as approved by the Engineer for the use of persons employed on the work, and properly secluded from public observations, shall be constructed and maintained by the Contractor. These conveniences shall be maintained at all times without nuisance and their use shall be strictly enforced. Upon completion of the work, they shall be removed from the premises, leaving the premises clean and free from nuisance.

Permits and Fees

The Contractor shall furnish all permits and fees required to carry out work in the applicable County and City, and as may be otherwise located and as required by other governmental agencies.

General

The Contractor shall at all times carry on the work in such a manner as to minimize the interference with traffic, utility and municipal services, and adjoining property owners egress, ingress and the use of their property.

Wherever excavation affects access to houses or public buildings, plank-foot bridges shall be placed at convenient intervals.

The work shall be carried out in such a manner that all physical structures and natural features are restored to at least as good a condition as they were before the work commenced. It is understood that where specifications apply, their provisions shall determine the character and manner of restoration.

All areas occupied by the Contractor during construction shall be completely cleaned up and all trash and/or debris shall be removed from the properties.

Handling Traffic

The Contractor shall furnish and be responsible for maintaining all barricades, flares, signs and other such safety devices as will be required, or as directed by the Engineer. All costs for providing signs, barricades, lights and flagmen shall be included in various prices bid for the Project by the Contractor.

Interference with Existing Utilities

The Contractor shall conduct his work in such a manner as not to endanger existing utilities whether shown on the drawings or not. The Contractor shall bear the cost of all repairs for damages resulting from his own carelessness or neglect.

Relocation of Utilities

Where it is necessary to relocate a utility, the need for such work shall be agreed upon by the Contractor and the Engineer in collaboration with an authorized representative of the Utility Company. The Utility Company shall be given adequate notice by the Contractor in order that the Utility Company will cooperate to expedite the work and not unduly delay the Contractor. All work on said utility and appurtenances must be done by the Utility Company.

Preservation and Restoration of Property, Trees and Shrubs

The Contractor shall not enter upon private property for any purpose without obtaining written permission of the Owner, and he shall be responsible for the preservation of all public and private property, trees and shrubs along and adjacent to the work, and shall use every precaution to prevent damage or injury thereto. The Contractor shall not injure, remove, cut or destroy trees, shrubs or flowerbeds which are outside of the construction limits. He shall be responsible during the prosecution of the work for all damage or injury to persons or to property of any character resulting from any act, omission, neglect or misconduct in his manner or method of executing said work satisfactorily, from his non-execution of said work or from defective work or materials.

Contractor's Insurance

Before commencement of work and in addition to other policies carried in his own interest, the contractor shall obtain such insurance as required by law to protect him and the owner from claims under workmen's compensation acts; such insurance as is necessary to fully protect him and the owner against other claims for bodily injury, including death, or from claims for property damage, any of which may arise from operations under this contract, whether such operations be by himself or any subcontractor or anyone directly or indirectly employed by either of them. All required insurance shall be obtained at the expense of the contractor. All policies shall show the Owner and the Engineer as an additional insured and shall be subject to approval by the owner as to insurer, adequacy of protection and equity in reimbursement for loss or damage. After approval, such policies shall be maintained in full force and effect and in amounts adequate to afford full coverage. Should any policy be canceled before final payment by the owner to the contractor and the contractor fails immediately to procure other insurance as specified, the owner reserves the right to procure such insurance and to deduct the cost thereof from any sum due the contractor under this contract.

In the event that the form of any policy of certificates or the amount of insurance or the companies writing same are not satisfactory to the Owner, the Contractor shall secure other policies or certificates in form and amount with companies satisfactory to the Owner. The Contractor shall not cause any policies to be canceled or permit them to lapse, and all insurance policies shall include a clause to the effect that the policy shall not be canceled or changed until 10 days after the Owner has received written notice as evidence by the return receipt of registered or certified letter.

a. Proof of Carriage of Insurance. "Certificates of Insurance" shall contain true transcripts from the policy, authenticated by the proper officer of the insurer, evidencing in particular these insured, the extent of the insurance, the location and operations to which the insurance applies, the effective date and expiration date and the notice of cancellation clause mentioned herein above. The Contractor shall not commence work under this contract until he has obtained and submitted to the Owner "Certificate of Insurance" for all insurance required under this paragraph and such has been approved by the Owner nor shall the Contractor allow any subcontractor to commence of his subcontract until all similar insurance required of the subcontractor has been obtained and approved.

b. Workmen's Compensation Insurance. The Contractor shall provide adequate Workmen's Compensation Insurance to cover all persons engaged on the work by him and, in case any of the work is sublet, the Contractor shall be responsible that the subcontractor's employees similarly are covered by such insurance, whether under policies furnished by the subcontractor or directly by the Contractor. This insurance shall be in strict accordance with the requirements of the most current and applicable state Workmen's Compensation Insurance Laws.

c. Public Liability and Property Damage. The Contractor shall maintain such insurance as will protect him against any and all claims and demands arising from injury to person or persons not in the employ of the Contractor, and against any and claims and demands resulting from damage to any property due to any act or omission of the Contractor, his agents or employees, in the operation of the work or the execution of this contract. Such insurance shall remain in effect on portions of the work which have been completed and which may or may not be occupied or utilized by the Owner prior to the completion and acceptance of all the work included in the contract. The Comprehensive General Liability Insurance will include as Additional Named Insureds: the Owner; the Engineer and his consultants; and each of their officers, agents, and employees.

Where the work to be performed under the Contract involves excavation of other underground work or construction, the property damage insurance provided shall cover all injury to or destruction of property below the surface of the ground, such as wires, conduits, pipes, mains, sewers, etc., caused by the Contractor's operations. Property damage insurance shall also cover the collapse of, or structural injury to, any building or structure on or adjacent to the Owner's premises, or the injury to or destruction of property resulting therefrom, caused by the removal of other buildings, structures; or supports, or by excavations below the ground where the construction of a new structure or the demolition of an existing structure involves any of the foregoing designated hazards and in all cases where the contract provides for alternations in, additions to, or the underpinning of, an existing structure or structures.

The Commercial General Liability policy shall protect against claims for bodily injury, including wrongful death and personal injury, as well as claims for property damage. The policies shall be written to protect the Owner and the Contractor, the minimum amounts of the various kinds of insurance not otherwise provided for shall be as follows:

Not less than One Million Dollars ($1,000,000) bodily injury and property damage.

Coverage should include underground and collapse provisions. Before any blasting will be permitted, the Contractor shall be required to obtain a Blasting Endorsement on his Public Liability and Property Damage Insurance Policy.

d. Protective Liability. The Contractor shall purchase, maintain, and deliver to the Owner a protective liability policy in the name of the Owner for operations of the Contractor or any subcontractor in connection with the execution of the contract.

The minimum amounts of such insurance shall be the same as required for public liability and property damage.

e. Contractor's Contingent or Protective Liability and Property Damage. In case part of this contract is sublet, the Contractor shall secure contingent or protective liability and property damage insurance to protect him from any and all claims arising from the operations of his subcontractors in the execution of work included in this contract. The coverage in each case shall be acceptable to the Owner, and shall not be less than that provided for Public Liability and Property Damage.

f. Builders' Risk "All-Risk" Insurance. Before commencement of the work, the Contractor shall submit written evidence that he has obtained, for the period of the Contract, Builders' Risk "All-Risk" Completed Value Insurance coverage upon the entire project which is the subject of this Contract and including completed work and work in progress. Such insurance shall include as Additional Named Insureds: the Owner; the Engineer and his consultants; and each of their officers, employees and agents; and any other persons with an insurable interest designated by the Owner as an Additional Named Insured.

Such insurance may have a deductible clause but amount of deductible shall not exceed $250.00.

g. Indemnities. The Contractor shall hold harmless, indemnify and defend the Owner, the Engineer and his consultants, and each of their officers and employees and agents, from any and all liability claims, losses or damage arising or alleged to arise from the performance of the work described herein, but not including the sole negligence of the Owner or the Engineer.

h. Automobile Public Liability and Property Damage. The Contractor shall maintain automobile liability insurance in the amount of not less than One Million Dollars ($1,000,000) bodily injury and property damage to protect him from any and all claims arising from the use of the following in the execution of work included in this contract:

a. Contractor's own automobiles and trucks
b. Hired automobiles and trucks
c. Automobiles and trucks not owned by the Contractor

Such insurance shall cover the use of the automobiles and trucks both on and off the site of the project.

Payment to Contractors

Payments on account of this contract will be made monthly as the work progresses. The Contractor shall submit to the Owner, in the manner and form prescribed, an application for each payment, and, if requested, receipts or other vouchers showing his payments for materials and labor, including payments to subcontractors. The Owner will make partial payments as soon thereafter as possible, for work done during the preceding calendar month on estimates certified to the Owner subject to the approval of the Engineer. The Owner shall retain ten (10) percent of the amount of each such estimate until final completion and acceptance of all work covered by the contract. Upon completion of fifty (50) percent of the contract work, the Contractor may at his option request a reduction in retainage to five (5) percent. There quest for a reduction must be in the form of a written request to the Engineer. The request shall be accompanied by a complete file of releases from subcontractors and material suppliers evidencing payment in a percentage equal to that paid the Contractor on previous monthly estimates. If in the opinion of the Engineer the work has progressed satisfactorily and there is no reason to believe the Contractor may default in the execution of the balance of the work, the Contractor will be notified that retainage on his subsequent estimates may be reduced to the five (5) percent figure. All bills, claims and demands for labor performed, work done or materials furnished, shall be submitted in three (3) copies by the Contractor.

For contracts, the cost of which is $5,000.00 or less, the preceding paragraph of this article shall not apply. Contracts falling within this category shall merit but a single payment that shall become due and payable on completion and acceptance of all work specified thereunder.

Materials delivered on site of work and not incorporated in work, and considered by the Engineer to be major items of considerable magnitude, if suitably stored on the site, will be allowed in estimates on the basis of ninety (90) percent of value as evidenced by submitted invoices.

Unbalanced Bids

Contractors are cautioned not to submit unbalanced bids, for any bid will be rejected if it stipulates prices for any item that, in the opinion of the owner or Engineer, are unreasonably high or low such that any probable or reasonable change in the quantity of work done would materially affect the relative standing of the bids.

Correction of Faulty Work After Final Payment

The approval of the final Request for Payment by the Engineer and the making of the final payment by the Owner to the Contractor shall not relieve the Contractor of responsibility for faulty materials or workmanship. The Owner shall promptly give notice of faulty materials or workmanship and the Contractor shall promptly replace any such defects discovered within one year from the date of written acceptance of the work. The Engineer shall decide all questions arising under this paragraph, and all such decisions shall be subject to arbitration. In addition to the existing common law remedies for tort and breach of contract, during a period of one year from and after the date of the final acceptance by the Owner of the work embraced in this contract, the Contractor shall make all needed repairs and replacements, arising out of defective workmanship, or materials, or both, which, in the judgement of the Owner, shall become necessary during such period. If within ten (10) days after the mailing of a notice in writing to the Contractor, or his agent, the said Contractor shall neglect to make, or undertake with due diligence to make the aforesaid repairs and replacements at the Contractor's expense; repairs and replacements may be made by the Owner without notice being sent to the Contractor, and the Contractor shall pay the cost thereof. In the case of an emergency where, in the judgement of the Owner, delay would cause serious loss or damage, repairs and replacements may be made without notice being sent to the Contractor, and the Contractor shall pay the cost thereof.

Compliance

The Contractor shall comply with all Federal, State, and Local laws and ordinances.

Escalation Clause

The Contract amounts; lump sum amounts and/or unit price amounts stipulated within the Proposal and within the Contract Agreement are not subject to escalation. Any increase in cost of material, labor and equipment reflected to the Contractor from date of Proposal Submittal to date of construction shall be at the Contractor's expense and without additional compensation to the Contractor by the Owner.

END OF SECTION 0080

Section 00805

SPECIFIC PROJECT REQUIREMENTS

Job Special Provisions shall prevail over General Special Provisions whenever in conflict therewith.

A. Inspection of Work
B. Utilities
C. Incidental Work
D. Clearing and Grubbing
E. Wage Rates and Payroll Submittals
F. Payment Estimates
G. Superintendent
H. Change Orders
I. Inspection
J. Acceptance
K. Licensing
L. Subcontracts and Approval
M. Consultant Construction Engineering and Inspection
N. Protection of Adjacent Property
O. Project Coordination

A. **INSPECTION OF WORK:**

The Contractor is hereby informed that the work and project records shall be subject to inspection by the Owner or his designated representative.

B. **UTILITIES:**

The Contractor shall make every effort to locate, both horizontally and vertically, all utilities that are located on the Project. Should it be necessary to relocate any of the utilities, it shall be the Contractor's responsibility to notify the utility owner and arrange for the relocation of the utility.

Any costs for the compliance with this provision shall be considered to be completely covered by other costs in the contract.

C. **INCIDENTAL WORK:**

All loose aggregate, dirt, debris, and vegetative matter shall be removed from the project prior to the initiation of construction activities.

Any expense incurred by the contractor by reason of compliance with the above requirement shall be considered as completely covered by the unit price for each of the pay items included in the contract.

D. **CLEARING AND GRUBBING:**

No direct payment will be made for clearing and grubbing.

E. **WAGE RATES AND PAYROLL SUBMITTALS:**

The Prevailing Wage Rates are applicable to this project and are part of these Contract Documents.

The Contractor shall submit payroll records, certifications of his workers and sub-contractors payroll records, certification for each payroll period prior to the next payroll period.

F. **PAYMENT ESTIMATES:**

Payment Estimates may be submitted once a month, on or before the 15th of the month for payment to be received the following month, on items of work shown on the Bid Proposal that are completed. Material tickets must be submitted with the pay estimate.

10% will be withheld until the final acceptance of the project by the owner.

G. **SUPERINTENDENT:**

The Contractor shall have a superintendent on the project at all times when work is occurring, and shall be the designated representative directing the work of the Contractor and Subcontractor.

All correspondence, messages, work orders or directives from the Owner shall be received by the Superintendent, unless prior arrangements have been made between Owner and Contractor.

H. **CHANGE ORDERS:**

All modifications to the work as outlined in the Contract Documents shall be approved by the Owner prior to those changes being implemented.

I. **INSPECTION:**

Inspection will be provided by the Owner and/or the Owner's Representative.

J. ACCEPTANCE:

Final acceptance of the project will be given when all work has been completed, the job site clean up and all materials have been removed, all change orders have been completed, and the final inspection has been conducted.

K. LICENSING:

The successful Bidder shall have a current Contractor's license with the Owner or be on the Owner's list of approved Contractor's, or be able to be approved.

L. SUBCONTRACTS AND APPROVAL:

The Contractor shall perform with his own organization contract work amounting to not less than 30% of the total contract price. The contract value of items designated in the contract as specialty items, when subcontracted, may be deducted from the total contract price before computing the amount of work required to be performed by the prime contractor.

All subcontracts shall be approved in writing by Owner.

The Contractor shall furnish to the Owner, the name and address of the subcontractor, the percentage and type of work to be sublet and assurances that the subcontractor is qualified to perform the work and is legally bound to comply with all the conditions of the contract.

No subcontractor shall further subcontract any of his work.

M. CONSULTANT CONSTRUCTION ENGINEERING AND INSPECTION:

Samples, Tests, and Cited Specifications: The Contractor shall submit certifications and substantiating test reports to the consultant, furnished by the supplier or fabricator, certifying that material and manufacturing procedures conform to the specifications. All sampling and testing required by the specifications shall be performed and paid for by the Contractor in accordance with these specifications, and the results shall be signed, sealed and stamped according to laws related to professional engineers. There shall be no direct charge to the Owner for materials taken as samples, either for field tests or for laboratory tests. If a specification of a recognized national standard agency (ASTM, AASHTO, AWWA, AWS, etc.) is designated, the material may, unless otherwise specified, meet either the designated specification or the latest revision thereof in effect at the time of letting of the contract. The consulting Engineer or inspector may require additional testing as determined by the Engineer.

N. PROTECTION OF ADJACENT PROPERTY:

The Contractor, at no expense to the Owner, shall repair or replace any item damaged on or adjacent to the construction site. This would include fencing and post, trees, shrubs, lawns, etc. outside the limits that are designated to be replaced.

O. PROJECT COORDINATION:

The contractor shall at all times coordinate with the Owner Representative for scheduling work to be completed.

END OF SECTION 00805

General Decision Number: IL150015 04/03/2015 IL15

Superseded General Decision Number: IL20140015

State: Illinois

Construction Types: Heavy and Highway

Counties: Adams, Brown, Cass, Champaign, Christian, Clark, Coles, Cumberland, De Witt, Douglas, Edgar, Logan, Macon, Mason, Menard, Morgan, Moultrie, Piatt, Pike, Sangamon, Schuyler, Scott, Shelby and Vermilion Counties in Illinois.

DE WITT COUNTY:

HEAVY CONSTRUCTION PROJECTS (including Sewer & Water Line Construction & Drainage Projects) & HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects, and railroad construction; bascule, suspension & spandrel arch bridges; bridges designed for commercial navigation; bridges involving marine construction, other major bridges).

Note: Executive Order (EO) 13658 establishes an hourly minimum wage of $10.10 for 2015 that applies to all contracts subject to the Davis-Bacon Act for which the solicitation is issued on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.10 (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/02/2015
1	01/23/2015
2	04/03/2015

BRIL0008-011 05/01/2011

LOGAN, MORGAN and SCOTT COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 26.87	15.73

CARP0237-001 05/01/2006

SCHUYLER COUNTY

	Rates	Fringes
CARPENTER	$ 25.35	13.78

CARP0237-012 05/01/2012

MASON COUNTY

	Rates	Fringes
CARPENTER	$ 28.84	22.03
PILEDRIVERMAN	$ 29.84	22.03

CARP0237-021 05/01/2012

DE WITT COUNTY

	Rates	Fringes
CARPENTER	$ 31.00	21.81
PILEDRIVERMAN	$ 32.00	21.81

CARP0243-001 06/01/2012

CHAMPAIGN, EDGAR, AND VERMILION COUNTIES

	Rates	Fringes
CARPENTER	$ 33.35	17.30
PILEDRIVERMAN	$ 34.35	17.30

CARP0243-006 06/01/2012

CLARK, COLES, CUMBERLAND, MOULTRIE, and SHELBY COUNTIES

	Rates	Fringes
CARPENTER	$ 29.95	20.70
PILEDRIVERMAN	$ 30.95	20.70

CARP0243-009 06/01/2012

DOUGLAS COUNTY

	Rates	Fringes
CARPENTER	$ 29.95	20.70
PILEDRIVERMAN	$ 30.95	20.70

CARP0270-004 05/01/2012

CHRISTIAN, MENARD, AND SANGAMON (Except Illiopolis) COUNTIES

	Rates	Fringes
CARPENTER	$ 29.81	21.04
PILEDRIVERMAN	$ 30.81	21.04

CARP0270-007 05/01/2012

ADAMS COUNTY

	Rates	Fringes
CARPENTER	$ 28.99	21.66
PILEDRIVERMAN	$ 29.99	21.66

CARP0270-016 06/01/2012

MACON, MOULTRIE (North of Rt #133), PIATT (Southwestern Half), SANGAMON (Illiopolis) AND SHELBY (Moweaqua & North thereof) COUNTIES

	Rates	Fringes
CARPENTER	$ 29.29	21.36
PILEDRIVERMAN	$ 30.29	21.36

CARP0270-021 05/01/2012

LOGAN COUNTY

	Rates	Fringes
CARPENTER	$ 29.51	21.36
PILEDRIVERMAN	$ 30.51	21.36

CARP0270-024 05/01/2012

BROWN, CASS, MORGAN, PIKE, AND SCOTT COUNTIES

	Rates	Fringes
CARPENTER	$ 28.87	21.78
PILEDRIVERMAN	$ 29.87	21.78

ELEC0034-012 06/01/2014

MASON (Except Bath, Crane Creek, Kilbourne, Lynchburg, Mason City, & Salt Creek TWPS) COUNTY

	Rates	Fringes
ELECTRICIAN	$ 34.66	17.93

---

* ELEC0051-003 03/02/2015

ADAMS, BROWN, CASS, CHAMPAIGN, CHRISTIAN, DEWITT, DOUGLAS, EDGAR, LOGAN, MACON, MASON, MENARD, PIATT, SCHUYLER, SCOTT, VERMILION, COLES (East Oakland, Humboldt, Morgan, North Okaw, and Seven Hickory TWPS), MORGAN, MOULTRIE (Except Whitley TWP), PIKE, SANGAMON, & SHELBY (that portion West of Holland, Prairie, Richland, and Windsor TWPS) COUNTIES

	Rates	Fringes
Line Construction		
Groundman/Equipment Operator (All crawler type equipment larger than D-4, 15 ton crane or larger)	$ 41.03	18.15
Groundman/Truck Driver	$ 29.52	14.46
Lineman and Substation		

Technician	$ 45.57	19.59

ELEC0146-003 01/01/2015

CHRISTIAN, COLES, CUMBERLAND, DE WITT (Harp, Wapella, Barnett, Clintonia, De Witt, Turnbridge, Texas, Creek & Nixon TWPS), DOUGLAS (Arcola, Burbon, Garrett TWPS & the portion of Tuscola lying West of the City of Tuscola & Illinois Central Railroad tracks), MACON, MOULTRIE, PIATT (Goose Creek, Willow Branch, Cerro Gordo, Bement & Unity TWPS), AND SHELBY COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 35.26	14.98

ELEC0193-004 06/04/2014

	Rates	Fringes
ELECTRICIAN		
CASS, LOGAN, MASON (Bath, Crane Creek, Kilbourne, Lynchburg, Mason City & Salt Creek TWPS), MENARD, MORGAN, SANGAMON and SCOTT COUNTIES	$ 34.19	15.38

ELEC0193-010 04/07/2014

CASS, LOGAN, MASON (Townships of Lynchburg, Bath, Kilbourne, Crane Creek, Salt Creek, and Mason), MENARD, MORGAN, SCOTT, AND SANGAMON COUNTIES

	Rates	Fringes
Line Construction		
Groundman - Equipment Operator (Class I, all crawler type equipment larger than D-4, 15 ton crane or larger)	$ 40.81	16.83
Groundman - Truck Driver (with winch, may oerate diggers, 5th wheel type trucks, crawler-type equipment, D-4 and smaller, backhoe 3/4 yard and under, rubber tire and crawler w/end loader, and may drive bucket truck and live boom type line trucks)	$ 31.15	14.03
Groundman - Truck Driver (without winch)	$ 29.38	13.52
Groundman (Class A)	$ 28.00	13.12
Lineman & Substation Tech...	$ 45.33	18.14

ELEC0197-003 06/01/2014

	Rates	Fringes
Electricians:	$ 35.00	16.78

ELEC0538-008 06/01/2014

VERMILION COUNTY

	Rates	Fringes
ELECTRICIAN	$ 32.54	17.83

ELEC0702-005 07/01/2014

CLARK, COLES (Southern Half), CUMBERLAND, MOULTRIE (Whitley TWP), and SHELBY (Except West of Holland, Prairie, Richland, & Windsor TWPS) COUNTIES

	Rates	Fringes
Line Construction		
Groundman - Class A	$ 27.97	13.87
Groundman - Equipment Operator Class II (all other equipment)	$ 33.94	15.60
Heavy - Equipment Operator Class I (all crawler type equipment D-4 and larger)	$ 38.01	16.78
Lineman	$ 47.62	19.56

* ENGI0649-006 04/01/2015

MASON COUNTY

	Rates	Fringes
OPERATOR: Power Equipment		
Group 1	$ 38.15	28.48+A
Group 2	$ 35.46	28.48+A
Group 3	$ 31.03	28.48+A

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Cranes: Overhead Cranes; Hydro Crane; Shovels; Crane type Backfiller; Tower Cranes-Mobile, Crawler, Stationary; Derricks, Hoist (3 drum); Draglines; Drott Yumbo & similar types considered as Cranes; 360 Degrees Swing Excavator, Backhoe; Derrick Boats; Pile Driver and Skid Rigs; Clam Shell; Locomotive Cranes; Road Pavers (Single Drum, Dual Drum, Tri Batcher); Motor Patrol & Power Blades (Dunmore, Elevating & similar types); Mechanics; Central Concrete Mixing Plant Operator; Asphalt Batch Plant Operator and Plant Engineer; Gradall; Caisson Rigs; Skimmer Scoop, Koehring Scooper; Dredges (all types); Hoptoe; All Cherry Pickers; Work Boat; Ross Carrier; Helicopter; Dozer; Tournadozer; Tournapulls (all & similar types); Concrete and all recycle machines, Multiple Unit Earth Movers; 75 cents per hour for each scoop over one; Scoops (all sizes); Pushcats; Endloaders (all types); Asphalt Surfacing

Machine; Slip Form Paver; Rock Crusher; Material Crusher (outside pits and quarries); Screening Plants (outside pits and quarries); Tunnel Boring Machine; Heavy Equipment Greaser (Top Greaser on Spread); CMI, Auto Grade, CMI Belt Placer (3 track & similar types); Side Booms; Starting Engineer on Pipeline or Construction (eleven 11 pieces or more); Asphalt Heater & Planer Combination; Wheel Tractors with Dozer, Hoe or End Loader attachements; CAT Earthwork Compactors and similar types; Blaw Knox Spreader & similar types; Trench Machines; Pump Crete, Belt Crete, Squeeze Crete, Screw Type Pumps & Gypsum; Creter Crane; Concrete Pump Truck; Formless Finishing Machines; Flaherty Spreader or similar types; Screedman on Laydown Machine; Vermeer Concrete Saw; Laser Screed; Span Saw; Dredge Leverman; Dredge Engineer; Lull or similar type; Hydro-Boom Truck; Guard Rail Machine.

GROUP 2: Bulker & Pump; Power Launches; Boring Machine & Pipe Jacking Machine; Dinkeys; Carts, powered haul unit for a boring machine; P-H one Pass Soil Cement Machines and similar types: Wheel Tractor; Back Fillers; Euclid Loader; Fork LIfts; Jeep with Ditching Machines or other attachments; Tuneluger; Automatic Cement & Gravel Batching Plants; Mobile Drills Soil Testing and similar types); Pugmill with Pump; All 1 and 2 Drum Hoists; De-watering Systems; Straw Blower; Hydro Seeder; Bump Grinders, Self Propelled; Assistant Heavy Equipment Greaser; Apsco Spreader Tractors (Track-Type w/o Power Units pulling Rollers); Rollers on Asphalt, Brick, or Macadam; Concrete Breakers; Concrete Spreaders; Cement Strippers; Cement Finishing Machines & CMI Texture & Reel Curing Machines; Vibro-Tampers & similar types self-propelled; Mechanical Bull-Floats; Self-Propelled Concrete Saw; Truck Mounted Power Saws; Curb Cutters; Mixers over 3 bags to 27E; Winch & Boom Trucks; Tractor pulling Power Blade or Elevating Grader; Porter Rex Rail; Clary Screed; Mule pulling Rollers; Pugmill w/o Pump; Barber Greene or similar Loaders; Track Type Tractor with power unit attached; Fireman; Spray Machine on paving; Curb Machine; Paved Ditch Machine; Power Broom; Self-Propelled Sweepers; Self-Propelled Conveyors; Power Subgrader; Oil Distributor; Straight Tractor; Truck Crane Oiler; Truck Type Oilers; Directional Boring Machine; Horizontal Directional Drill; Articulating End Dump Vehicles; Starting Engineer (6 to 10 pieces).

GROUP 3: Straight Framed Truck and Truck Mounted Vac Unit, Starting Engineer (3 to 5 pieces); Trac Air Machine w/o attachments; Rollers, 5 tons & under on earth & gravel; Form Grader; Bulk Cement Plant; Oilers.

- Escalated Rate on Crane, Derrick Booms, and Tower Cranes: Additional $1.00 per hour over scale when Crane or Derrick is positioned 50 ft. or more above adjacent ground level or water level. $.05 per hour, per foot, over 90 feet including jib. $0.02 per hour, per ton - over 50-ton capacity.

- Operating engineers who operate Lattice Boom Crawler Cranes, Lattice Boom Truck Cranes, Telescopic Boom Cranes

less than 17.5 Tons, Tower Cranes, Overhead Cranes and have been Certified by hte National Commission for the Certification of Crane Operators on the equipment they operate shall receive $1.60 per hour over scale.

A. On designated Hazardous Waste jobs, operators shall receive:
Level A add $4.00 to the appropriate group rate; Levels B and C add $3.00 to the appropriate group rate; and Level D add $2.00 to the appropriate group rate.

ENGI0841-003 04/01/2013

CHAMPAIGN, CLARK, COLES, CUMBERLAND, DOUGLAS EDGAR, MOULTRIE, and VERMILION COUNTIES

	Rates	Fringes
OPERATOR: Power Equipment		
GROUP 1	$ 36.95	16.75
GROUP 2	$ 23.90	16.75

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Power Cranes, Draglines, Derricks, Shovels, Gradalls, Mechanics, Tractor Highlift, Tournadozer, Concrete Mixers with Skip, Tournamixer, Two-Drum Machine, One-Drum Hoist with Tower or Boom, Cableways, Tower Machines, Motor Patrol, Boom Tractor, Boom or Winch Truck, Winch or Hydraulic Boom Truck, Truck Crane, Tournapull, Tractor Operating Scoops, Bulldozer, Push Tractor, Asphalt Planer, Finishing Machine on Asphalt, Large Rollers on Earth, Rollers on Asphalt Mix, Ross Carrier or Similar Machine, Gravel Processing Machine, Asphalt Plant Engineer, Paver Operator, Farm Tractor with Half Yard Bucket and/or Backhoe Attachments, Dredge Engineer, or Dredge Operator, Central Mix Plant Engineer, CMI or Similar Type Machine, Truck or Skid Mounted Concrete Pump, Tower Crane, Engine or Rock Crusher Plant, Concrete Plant Engineer, Ditching Machine with Dual Attachment, Tractor Mounted Loaders, Cherry Picker, Hydro Crane, Standard or Dinney Locomotives, Scoopmobiles, Euclid Loader, Soil Cement Machine, Back Filler, Elevating Machine, Power Blade, Drilling Machines Including Well Testing, Caissons, Shaft or Any Similar Type Drilling Machines, Motor Driven Paint Machine, Pipe Cleaning Machine, Pipe Wrapping Machine, Pipe Bending Machine, Apsco Paver, Boring Machine, (Head Equipment Greased), Barber- Greene Loaders, Formless Paver, (Well Point System), Concrete Spreader, Hydra Ax, Span Saw and Similar Types, Marine Scoops, Brush Mulcher, Brush Burner, Mesh Placer, Tree Mover, Helicopter Crew (3), Piledriver - Skid or Crawler, Stump Remover, Root Rake, Tug Boat Operator, Refrigerating Machine, Freezing Operator, Chair Cart-Self Propelled, Hydra Seeder, Straw Blower, Power Sub Grader, Bull Float, Finishing Machine, Self-Propelled Pavement Breaker (Backhoe Attached), Lull (or Similar Type Machine), Two Air Compressors, Compressors Hooked in Manifold, Overhead Crane, Chip Spreader, Mud Cat, Sull-Air

Fork Lifts (Except When Used For Landscaping Work), Soil Stabilazer (Seaman Tiller, Bo Mag, Rago Gator and Similar Types or Equipment), Tube Float, Spray Machine, Curing Machine, Concrete or Asphalt Milling Machine, Snooper Truck Operator.

GROUP 2: Concrete Mixers Without Skips, Rock Crusher, Ditching Machine Under 6', Curbing Machine, one Drum Machines without Tower or Boom, Air Tugger, Self-Propelled Concrete Saw, Machine- Mounted Post Hole Digger, Two to Four Generators, Water Pumps, or Welding Machines, within 400ft., Air Compressor 600 cu. ft. and Under, Rollers on Aggregate and Seal Coat Surfaces, Fork Lifts (When Used For Landscaping Work, Concrete and Blacktop Curb Machine, Farm Tractor with less than Half Yard Bucket, One Water Pump, Oilers, Air Valves or Steam Valves, One Welding Machine, Truck Jack, Mud Jack, Gunnite Machine, House Elevators when used for Hoisting Material, Engine Tenders, Wagon Drill, Flex Plane, Conveyor, Siphons and Pulsometer, Switchman, Fireman on Paint Pots, Fireman on Asphalt Plants, Distributor Operators on Trucks, Tampers, Self-Propelled Power Broom, Striping Machine (Motor Driven), Form Tamper, Bulk Cement Plant Equipment Greaser, Deck Hands, Truck Crane Oiler_Driver, Cement Blimps, Form Grader, Temporary Heat, Throttle Valve, Farm Tractor, Super Sucker (and Similar Type of Equipment).

ENGI0965-002 05/01/2014

ADAMS, BROWN, CASS, CHRISTIAN, DE WITT, LOGAN, MACON, MENARD, MORGAN, PIATT, PIKE, SANGAMON, SCHUYLER, SCOTT, and SHELBY COUNTIES

	Rates	Fringes
Operating Engineers:		
Group 1	$ 38.65	12.55
Group 2	$ 34.56	12.55
Group 3	$ 28.32	12.55
Group 4	$ 40.15	12.55

PREMIUM PAY -

CRANES WITH BOOMS 120-200 ft. 1.00 per hour;

.02 Per Foot for each foot above 200

MULTIPLE UNIT MACHINE - 1.00 per hour;

UNDERGROUND WORK - 1.00 per hour;

UNDER AIR PRESSURE - 1.00 per hour;

HAZARDOUS WASTE OR ASBESTOS REMOVAL PROJECTS - 1.00 per hour for Level C work;

1.50 per hour for Level B work;

2.00 per hour for Level A work;

LONG BOOM ON A STATIONARY CRANE 1.00 per hour above long Boom Scale

Level A: (highest level of repiratory, skin, and eye protection)

Level B: (same as Level A, but a lower level of skin protection)

Level C: (same as Level B, but a lower level of respiratory protection)

OPERATING ENGINEER CLASSIFICATIONS:

GROUP 1: Asphalt Plant Engineer; Asphalt screed man; Apsco concrete spreader; Asphalt paver; Asphalt roller on bituminous contrete; Athey loaders; Cableways; Cherry Picker; Clam Shell; C.M.I. & Similar Type Autograde Formless Paver, Autgrade Placer & Finisher; Concrete Breaker; Concrete plant Oper; Concrete Pumps; Cranes; Derricks; Derrick boats; Draglines; Earth auger boring machine, Elevating Graders; Engineers on dredge; Gravel processing machines; Head equipment greaser; High lift or fork lift; Hoist with two drums or 2 or more loadlines; Locomotive; Mechanics; Motor graders or auto patrols; Operators or levelman on dredges; Power boat oper; Pug mill operator; (Asphalt plat); Orange peels; Overhead cranes; Paving mixer; Piledrivers; Pipe wraper & Painting machines; Push dozers, or Push cats; Rock crusher; Ross carrier or similar machine; Scoops; Skimmers 2 cu yd capacity & Under: Sheep foot roller (self propelled); Shovels; Skimmer; Scoops; Test hole drilling machines; Tower machine; Tower mixer; Track Tupe & Loaders; Track type forklifts or high lifts; Track jacks & Tampers; Trackors; Sideboom; Trenching machine; Ditching machine; Tunnel lugger; Wheel type end loader; Winch cat; Scoops (All or tournapull).

GROUP 2: Asphalt booster & Heater; Asphalt distributor; Asphalt plant fireman;Building Elevator; Bull float or flexplane; Concrete finshing machine; Concrete saw, self propelled; Concrete spreader machine; Gravel or stone spreader, Power operated; Hoist automatic; Hoist with one drum & one load line; Oiler on 2 paving mixers when used in tandem boom or winch truck; Ost hole diggers; Mechanical; Road or street sweeper, Self-propelled; Scissors hoist; Seaman tiller; Straw machine; Vibratory compactor; Well drill machine; & Mud jacks.

GROUP 3: Air compressor, Track or self-propelled; Bulk cement batching- plants; Conveyors; Concrete mixers (Except Plant, Paver, Tower) Firement, Generators; Greasers; Light plants; Mechanical theater; Oilers; Power from graders; Power sub-grader; Pug mill, When used other than asphalt operation; Roolers (Except bituminous); Tractors w/o Power attachments regardless of size or type; Truck crane oiler; & driver (one man); Vibratory hammer; Water pump; Welding machine (one 300 amp or over) Combinations of five of any air compressors; Conveyors, Welding Machines, Water pumps;

Light plants or Generators shall be in batteries or with in 300 ft.

Group 4: Lattice Boom crawler crane, Lattice Boom truck crane, Telescopic truck mounted crane, Tower crane.

IRON0022-006 06/01/2014

CLARK, COLES, CUMBERLAND, EDGAR, SHELBY, AND VERMILION COUNTIES

	Rates	Fringes
IRONWORKER	$ 29.84	19.55

IRON0046-002 05/01/2014

BROWN, CASS, CHRISTIAN, DEWITT (Western Half), LOGAN, MACON (Except portion East of Decatur), MASON, MENARD, MORGAN, PIKE, SANGAMON, SCHUYLER (Eastern Half), SCOTT, AND SHELBY (Western Half) COUNTIES

	Rates	Fringes
IRONWORKER	$ 31.00	22.27

IRON0380-003 05/01/2013

MACON COUNTY (East of Decatur)

	Rates	Fringes
IRONWORKER	$ 31.61	18.76

IRON0577-004 06/01/2014

ADAMS and SCHUYLER (Western Half) COUNTIES

	Rates	Fringes
IRONWORKER	$ 25.25	18.70

LABO0159-003 05/01/2014

CLARK, COLES, CUMBERLAND, DOUGLAS, EDGAR, MACON, MOULTRIE, AND SHELBY COUNTIES

	Rates	Fringes
LABORER	$ 29.55	18.89

LABO0231-009 05/01/2014

ADAMS COUNTY

	Rates	Fringes
LABORER	$ 25.07	21.55

LABO0231-011 05/01/2014

BROWN, MASON, PIKE, AND SCHUYLER COUNTIES

	Rates	Fringes
LABORER	$ 25.57	21.05

LABO0477-002 05/01/2014

MENARD AND SANGAMON COUNTIES

	Rates	Fringes
LABORER	$ 28.47	19.11

LABO0477-004 05/01/2014

CHRISTIAN COUNTY

	Rates	Fringes
LABORER	$ 28.47	19.11

LABO0477-005 05/01/2014

LOGAN COUNTY

	Rates	Fringes
LABORER	$ 28.47	19.11

LABO0477-009 05/01/2014

CASS, MORGAN, AND SCOTT COUNTIES

	Rates	Fringes
LABORER	$ 28.47	19.11

LABO0703-002 05/01/2013

CHAMPAIGN, DE WITT, and PIATT COUNTIES

	Rates	Fringes
LABORER	$ 29.70	17.69

LABO0703-008 05/01/2013

VERMILION COUNTY

	Rates	Fringes
LABORER	$ 29.70	17.69

PAIN0058-008 05/01/2014

PIKE COUNTY

	Rates	Fringes
Painter, Bridge	$ 30.54	15.98

Epoxy or Toxic-Lead-Based Paint Work-$1.00 Premimum

PAIN0090-002 05/01/2014

ADAMS, BROWN, CASS, LOGAN, MENARD, MORGAN, and SCOTT COUNTIES

	Rates	Fringes
PAINTER	$ 29.58	15.68

Epoxy or Toxic-Lead-Based Paint Work-$1.00 Premimum

PAIN0090-006 05/01/2014

Sangamon County

	Rates	Fringes
PAINTER	$ 29.58	15.68

Epoxy or Toxic-Lead-Based Paint Work-$1.00 Premimum

PAIN0157-003 07/01/2014

MASON AND SCHULYER COUNTIES

	Rates	Fringes
PAINTER		
Brush, Spray, Pressure Roller, Sandblasting, Bridges, & New Structural Steel Work	$ 33.65	19.85

PAIN0288-002 05/01/2014

DE WITT, MACON, MOULTRIE, PIATT, and SHELBY COUNTIES

	Rates	Fringes
PAINTER		
Paperhanging and Drywall Taping	$ 28.00	17.27
Spray and Sandblasting	$ 28.75	17.27

Epoxy or Toxic-Lead-Based Paint Work-$1.00 Premimum

PAIN0363-001 05/01/2014

CHAMPAIGN, COLES, CUMBERLAND, DOUGLAS, and VERMILION COUNTIES

	Rates	Fringes
PAINTER	$ 34.46	12.28

Epoxy or Toxic-Lead-Based Paint Work-$1.00 Premimum

PAIN1705-002 05/01/2014

CLARK and EDGAR COUNTIES

	Rates	Fringes
PAINTER		
Blasting, Spraying & Pressure Washing	$ 27.30	18.02
Brush & Roller and Wall Covering Drywall Preparing	$ 26.30	18.02

Epoxy or Toxic-Lead-Based Paint Work-$1.00 Premimum

PLAS0018-003 05/01/2012

DEWITT (North of Route 10)

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 31.00	17.48

PLAS0018-021 05/01/2013

DE WITT (South of Route 10) & MACON COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 27.87	18.83

PLAS0018-032 05/31/2011

ADAMS, BROWN, CASS, CHRISTIAN, MENARD, PIKE, and SANGAMON COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 23.85	18.75

PLAS0143-003 05/01/2014

CHAMPAIGN, CLARK, COLES, CUMBERLAND, DOUGLAS, EDGAR, MOULTRIE, PIATT, SHELBY, AND VERMILION COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 31.63	16.75

TEAM0065-007 05/01/2013

CHAMPAIGN, COLES, CUMBERLAND, DEWITT, DOUGLAS, MASON, MOULTRIE (East of a line from the Northeast corner of the county extending Southeast in the direction of Findlay (Shelby County) to a point that intersects the Shelby County line), PIATT (East of a line from where the DeWitt County line intersects Route 10 in a Southeast direction towards the Southeast corner of the

county), SHELBY (East of an imaginary line beginning at the Northeast border with Moultrie County extending Southwest in the direction of Findlay and continuing to an imaginary point 2.5 miles South of Middlesworth that parallels the Cumberland County line), and VERMILION COUNTIES

	Rates	Fringes
TRUCK DRIVER		
Group 1	$ 32.04	10.70+a
Group 2	$ 32.50	10.70+a
Group 3	$ 32.72	10.70+a
Group 4	$ 33.02	10.70+a
Group 5	$ 33.88	10.70+a

FOOTNOTE: a. $201.20 per week

CLASSIFICATIONS:

GROUP 1: Drivers on 2 axles hauling less than 9 tons; air compressor & welding machines and brooms, including those pulled by separate units; Truck Driver Helper, warehouse employees; Mechanic Helpers; greasers and tiremen; pick-up trucks when hauling material, tools, or workers to and from and on the job site; and forklifts up to 6,000 lb capacity.

GROUP 2: 2 or 3 axles hualing more than 9 tons but hauling less than 16 tons; A-frame winch trucks; hydrolift trucks; Vactor Trucks or similar equipment when used for transportation purposes; Forklift over 6,000 lb.capacity; winch trucks; and four axle combiation units.

GROUP 3: 2, 3 or 4 Axles hauling 16 tons or more; 5-Axles or more combination units; drivers on water pulls; articulated dump trucks; mechanics and working forepersons.

GROUP 4: Low Boy and Oil Distributors.

GROUP 5: Drivers who require special protective clothing while employed on hazardous waste work.

TEAM0065-012 05/01/2013

ADAMS, BROWN, CASS, CHRISTIAN, LOGAN, MACON, MENARD, MORGAN, MOULTRIE (West of a line from the Northeast corner extending straight Southeast inthe direction of Findlay - Shelby County - to a point that intersects the Shelby County line), PIATT (West of a line frome where the DeWitt County line intersects Route 10 in a Southeast direction towards the Southeast corner of the county), PIKE, SANGAMON, SCHUYLER, SCOTT, and SHELBY (West of an imaginary line beginning at the Northeast border with Moultrie County extending Southwest in the direction of Findlay and continuing to the same point 2.5 miles South of Middlesworth then towards the Northeast corner of Fayette County) COUNTIES

	Rates	Fringes

TRUCK DRIVER

Group 1	$ 30.87	17.00
Group 2	$ 31.34	17.00
Group 3	$ 31.56	17.00
Group 4	$ 31.86	17.00
Group 5	$ 32.71	17.00

CLASSIFICATIONS:

GROUP 1: Drivers on 2 axles hauling less than 9 tons; air compressor & welding machines and brooms, including those pulled by separate units; Truck Driver Helper, warehouse employees; Mechanic Helpers; greasers and tiremen; pick-up trucks when hauling material, tools, or workers to and from and on the job site; and forklifts up to 6,000 lb capacity.

GROUP 2: 2 or 3 axles hualing more than 9 tons but hauling less than 16 tons; A-frame winch trucks; hydrolift trucks; Vactor Trucks or similar equipment when used for transportation purposes; Forklift over 6,000 lb.capacity; winch trucks; and four axle combiation units.

GROUP 3: 2, 3 or 4 Axles hauling 16 tons or more; 5-Axles or more combination units; drivers on water pulls; articulated dump trucks; mechanics and working forepersons.

GROUP 4: Low Boy and Oil Distributors.

GROUP 5: Drivers who require special protective clothing while employed on hazardous waste work.

TEAM0135-008 05/01/2009

CLARK and EDGAR COUNTIES

	Rates	Fringes
TRUCK DRIVER		
Group 1	$ 28.955	9.30+a
Group 2	$ 29.355	9.30+a
Group 3	$ 29.555	9.30+a
Group 4	$ 29.805	9.30+a
Group 5	$ 30.555	9.30+a

FOOTNOTE: a. $23.20 per day

CLASSIFICATIONS:

Group 1 - Drivers on 2 axle truckshauling less than 9 ton; Air compressor and welding machines and brooms, including those pulled by separate units; Truck Driver Helpers; Warehouse employees; Mechanic helpers; Greasers and tiremen; fork lifts up to 6,000 pounds capacity

Group 2 - 2 or 3 axle trucks hauling more than 9 ton but hauling less than 16 ton; A-frame winch trucks; Hydrolift trucks; Vactor trucks or similar equipment when used for transportation purposes; Fork lifts over 6,000 pound

capacity; Winch trucks; 4 axle combination units; In the event the Employer desires to use ticket writers that classification shall come under Group II

Group 3 - 2, 3, or 4 axle trucks hauling 16 ton or more; Drivers on water pulls; Articulated Dump Trucks; Mechanics and working forepersons; 5 axle or more combination units

Group 4 - Low Boy; Oil Distributors

Group 5 - Drivers who require special protective clothing while employed on hazardous waste work.

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)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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.

==========

END OF GENERAL DECISION

General Decision Number: IL150001 04/03/2015 IL1

Superseded General Decision Number: IL20140001

State: Illinois

Construction Type: Building

Counties: Adams, Bond, Boone, Brown, Bureau, Calhoun, Carroll, Cass, Clinton, De Kalb, Fulton, Greene, Hancock, Henderson, Henry, Jersey, Jo Daviess, Knox, La Salle, Lee, Livingston, Logan, Macoupin, Marshall, Mason, McDonough, McLean, Menard, Mercer, Monroe, Montgomery, Morgan, Ogle, Pike, Putnam, Randolph, Rock Island, Schuyler, Scott, Stark, Stephenson, Warren, Washington, Whiteside, Winnebago and Woodford Counties in Illinois.

BUILDING PROJECTS (does not include single-family homes and apartments up to and including four stories, and also does not include landscape projects for BOONE and DEKALB COUNTIES).

Note: Executive Order (EO) 13658 establishes an hourly minimum wage of $10.10 for 2015 that applies to all contracts subject to the Davis-Bacon Act for which the solicitation is issued on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.10 (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/02/2015
1	01/23/2015
2	01/30/2015
3	02/06/2015
4	02/27/2015
5	03/06/2015
6	04/03/2015

ASBE0017-003 06/01/2014

BUREAU, DE KALB, LA SALLE, LEE, LIVINGSTON AND PUTNAM COUNTIES

	Rates	Fringes
ASBESTOS WORKER/INSULATOR includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical systems	$ 48.45	24.35
Fire Stop Technician	$ 38.76	23.15
HAZARDOUS MATERIAL HANDLER		

includes preparation, wetting, stripping removal scrapping, vacuuming, bagging and disposal of all insulation materials, whether they contain asbestos or not, from mechanical systems.....$ 36.34 23.15

ASBE0017-007 06/01/2014

MARSHALL, MCLEAN, STARK, and WOODFORD COUNTIES

	Rates	Fringes
ASBESTOS WORKER/INSULATOR includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical systems	$ 43.35	24.35
Fire Stop Technician	$ 34.68	23.15
HAZARDOUS MATERIAL HANDLER includes preparation, wetting, stripping removal scrapping, vacuuming, bagging and disposal of all insulation materials, whether they contain asbestos or not, from mechanical systems	$ 32.51	23.15

ASBE0019-003 06/01/2014

BOONE, OGLE, STEPHENSON, and WINNEBAGO COUNTIES

	Rates	Fringes
Asbestos Workers/Insulator (includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical systems)	$ 33.53	26.75

ASBE0081-002 06/01/2014

CARROLL, HANCOCK, HENDERSON, HENRY, JO DAVIESS, KNOX, MCDONOUGH, MERCER, ROCK ISLAND, WARREN, and WHITESIDE COUNTIES

	Rates	Fringes
Asbestos Workers/Insulator (Includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical		

systems).....$ 29.83 19.08

BOIL0001-004 01/01/2014

BOONE, DE KALB, & WINNEBAGO COUNTIES

	Rates	Fringes
BOILERMAKER	$ 42.13	25.45

BOIL0060-001 01/01/2014

BUREAU, CARROLL, FULTON, HANCOCK, HENDERSON, HENRY, JO DAVIESS, KNOX, LA SALLE, LEE, LIVINGSTON, LOGAN, MCDONOUGH, MCLEAN, MARSHALL, MASON, MERCER, OGLE, PUTNAM, ROCK ISLAND, SCHUYLER, STARK, STEPHENSON, WARREN, WHITESIDE, and WOODFORD COUNTIES

	Rates	Fringes
BOILERMAKER	$ 37.86	21.55

BOIL0363-003 01/01/2012

ADAMS, BOND, BROWN, CALHOUN, CASS, CLINTON, GREENE, JERSEY, MACOUPIN, MENARD, MONROE, MONTGOMERY, MORGAN, PIKE, RANDOLPH, and WASHINGTON COUNTIES

	Rates	Fringes
BOILERMAKER	$ 30.90	27.35

BRIL0006-001 06/01/2012

BUREAU, HENRY, LASALLE, LIVINGSTON, PUTNAM, and STARK COUNTIES

	Rates	Fringes
BRICKLAYER	$ 36.72	16.90

BRIL0006-002 06/01/2012

BUREAU, HENRY, LA SALLE, LIVINGSTON, PUTNAM, and STARK COUNTIES

	Rates	Fringes
TILE FINISHER	$ 32.41	12.77
TILE LAYER	$ 35.09	15.08

BRIL0006-004 05/01/2013

MERCER and ROCK ISLAND COUNTIES

	Rates	Fringes
Bricklayer, Caulker, Cleaner, Pointer & Stonemason	$ 27.45	13.80

BRIL0006-005 06/01/2012

FULTON, HENDERSON, KNOX, MARSHALL, WARREN, and WOODFORD COUNTIES

	Rates	Fringes
BRICKLAYER	$ 32.06	17.06

BRIL0006-008 06/01/2012

MCLEAN COUNTY

	Rates	Fringes
Bricklayer, Caulker, Cleaner, Pointer & Stonemason	$ 29.82	18.93

BRIL0006-009 06/01/2012

FULTON, HENDERSON, KNOX, MARSHALL, MCLEAN, WARREN, and WOODFORD COUNTIES

	Rates	Fringes
Base Machine Men	$ 29.75	17.06
Marble & Tile Setter and Terrazzo Worker	$ 31.51	17.06

BRIL0006-017 06/01/2012

CARROLL, JO DAVIESS, LEE, OGLE, STEPHENSON, WHITESIDE, and WINNEBAGO COUNTIES

	Rates	Fringes
Bricklayer, Caulker, Cleaner, Pointer & Stonemason	$ 35.88	19.91

BRIL0006-018 06/01/2012

BOONE COUNTY

	Rates	Fringes
Bricklayer, Caulker, Cleaner, Pointer & Stonemason	$ 37.38	19.91

BRIL0006-020 06/01/2012

BUREAU, DE WITT, HENRY, LA SALLE, LIVINGSTON, MERCER, PUTNAM, ROCK ISLAND AND STARK COUNTIES

	Rates	Fringes
Base Machine Men	$ 29.75	17.06

BRIL0006-023 06/01/2012

BOONE, CARROLL, DEKALB, JO DAVIESS, LEE, OGLE, STEPHENSON, WHITESIDE & WINNEBAGO COUNTIES

	Rates	Fringes
Marble & Tile Setter and Terrazzo Worker	$ 35.09	15.08
Marble, Tile & Terrazzo Finisher	$ 32.41	12.77

BRIL0006-026 05/01/2013

MERCER & ROCK ISLAND COUNTIES

	Rates	Fringes
Marble & Tile Setter and Terrazzo Worker	$ 23.77	13.63

BRIL0008-002 05/01/2014

RANDOLPH COUNTY

	Rates	Fringes
Bricklayer, Caulker, Cleaner, Pointer & Stonemason	$ 29.67	16.27

BRIL0008-007 05/01/2011

BOND, CALHOUN, CLINTON, JERSEY, MACOUPIN (STAUNTON & MT. OLIVE), MONROE, MONTGOMERY, AND WASHINGTON COUNTIES

	Rates	Fringes
BRICKLAYER		
Bricklayer, Marble, and Tile Layer	$ 30.29	17.08
Terrazzo Worker	$ 30.79	10.88

BRIL0008-008 05/01/2014

ADAMS, BROWN, CASS, GREENE, HANCOCK, MACOUPIN (Except Staunton & Mt. Olive), MORGAN, MCDONOUGH, PIKE, SCHUYLER, AND SCOTT COUNTIES

	Rates	Fringes
BRICKLAYER	$ 30.00	18.31

BRIL0008-009 05/01/2014

MORGAN AND SCOTT COUNTIES

	Rates	Fringes
Cement Mason/Plasterer	$ 30.00	18.31

BRIL0008-010 05/01/2014

LOGAN, MASON, and MENARD COUNTIES

	Rates	Fringes
Bricklayer, Caulker, Cleaner, Pointer & Stonemason	$ 30.00	20.39

BRIL0008-027 05/01/2014

ADAMS, BROWN, CASS, GREENE, HANCOCK, MACOUPIN, MORGAN, MCDONOUGH, PIKE, SCHUYLER, AND SCOTT COUNTIES

	Rates	Fringes
Marble & Tile Setter and Terrazzo Worker	$ 29.53	17.52
Marble, terrazzo and tile finisher	$ 28.03	17.52

BRIL0008-028 05/01/2014

LOGAN, MASON, and MENARD COUNTIES

	Rates	Fringes
Marble Setter, Terrazzo Worker & Tile Setter	$ 29.53	17.52
Marble, terrazzo and tile finisher	$ 28.03	17.52

BRIL0008-029 05/01/2014

RANDOLPH COUNTY

	Rates	Fringes
Marble Finisher, terrazzo finisher and tile finisher	$ 28.17	16.27

BRIL0021-005 06/01/2014

DE KALB COUNTY

	Rates	Fringes
BRICKLAYER (including Cement Mason)	$ 42.58	23.80

CARP0166-001 05/01/2014

HENDERSON, HENRY, MERCER, AND ROCK ISLAND COUNTIES

	Rates	Fringes
CARPENTER (Carpenters, Lathers, Carpet, Linoleum,		

and Soft Tile Layers).....$ 27.30 18.72

CARP0195-001 06/01/2014

BUREAU, LA SALLE, MARSHALL, PUTNAM, and STARK COUNTIES

	Rates	Fringes
CARPENTER	$ 31.00	24.90

CARP0237-004 05/01/2014

FULTON AND MASON COUNTIES

	Rates	Fringes
Carpenter/Lather	$ 30.38	23.31

CARP0237-009 05/01/2014

KNOX COUNTY

	Rates	Fringes
Carpenter/Lather	$ 30.38	23.31
Piledriver	$ 31.38	23.31

CARP0237-015 05/01/2014

WOODFORD COUNTY

	Rates	Fringes
Carpenter/Lather	$ 30.38	23.31
Piledriver	$ 31.38	23.31

CARP0237-020 05/01/2014

	Rates	Fringes
Carpenter/Lather	$ 30.35	23.31
Piledriver	$ 30.35	23.31

CARP0270-001 05/01/2014

MENARD COUNTY

	Rates	Fringes
Carpenter/Lather	$ 30.45	22.50
Piledriver	$ 31.45	22.50

CARP0270-006 05/01/2014

ADAMS COUNTY

	Rates	Fringes
Carpenter/Lather	$ 29.23	23.72
Piledriver	$ 30.23	23.72

CARP0270-009 05/01/2014

HANCOCK, MCDONOUGH, AND WARREN COUNTIES

	Rates	Fringes
Carpenter/Lather	$ 30.01	23.72
Piledriver	$ 31.01	23.72

CARP0270-013 05/01/2014

MACOUPIN AND MONTGOMERY COUNTIES

	Rates	Fringes
Carpenter/Lather	$ 29.23	23.72
Piledriver	$ 30.23	23.72

CARP0270-020 05/01/2014

LOGAN COUNTY

	Rates	Fringes
Carpenter/Lather	$ 29.97	23.72
Piledriver	$ 30.97	23.72

CARP0270-022 05/01/2014

BROWN, CASS, GREENE, MORGAN, PIKE, SCHUYLER, AND SCOTT COUNTIES

	Rates	Fringes
Carpenter/Lather	$ 28.70	24.25
Piledriver	$ 29.70	24.25

CARP0500-004 05/04/2014

CLINTON (EXCLUDING BROOKSIDE TWP), MONROE RANDOLPH, and WASHINGTON COUNTIES

	Rates	Fringes
CARPENTER (Lather, Piledriver, and Millwright)	$ 35.67	15.05
Carpet Installer (Carpet, Linoleum, Hardwood, and Tile Layer)	$ 30.33	14.97

CARP0640-001 05/04/2014

ALEXANDER, FRANKLIN, HARDIN, MASSAC, JACKSON, PERRY, POPE, JOHNSON, GALLATIN, PULASKI, SALINE, UNION, and WILLIAMSON COUNTIES

	Rates	Fringes

CARPENTER (Lather, Piledriver, and Millwright)	$ 32.93	15.05
Carpet Installer (Carpet, Linoleum, Hardwood, and Tile Layer)	$ 30.33	14.97

DIVERS (Receive 1 1/2 times Carpenter's rate plus fringe benefits and $25.00 per day for equipment)

CARP0664-001 05/04/2014

GREENE COUNTY (South of Apple Creek)

	Rates	Fringes
Carpenter, Lather, Soft Floor Layer	$ 35.67	15.05

CARP0664-004 05/04/2014

BOND, CALHOUN, and JERSEY COUNTIES

	Rates	Fringes
CARPENTER (Lather, Piledriver, and Millwright)	$ 35.67	15.05
Carpet Installer (Carpet, Linoleum, Hardwood, and Tile Layer)	$ 30.33	14.97

CARP0790-001 06/01/2014

CARROLL, DE KALB, JO DAVIESS, LEE, OGLE (Southern Half), STEPHENSON, and WHITESIDE COUNTIES

	Rates	Fringes
Carpenter/Lather		
Carroll, Jo Daviess, Lee (West of Brooklyn Road), Ogle (Remainder of Southern Half), Stephenson, and Whiteside	$ 32.04	24.90
DeKalb, Lee (East of Brooklyn Road), Ogle (Territory within IL Route 72, Meridian Road & the southern Ogle County Line)	$ 37.36	21.25

CARP0792-001 06/01/2013

BOONE, OGLE (Northern Half), and WINNEBAGO COUNTIES

	Rates	Fringes
Carpenter, Lather, Soft Floor Layer	$ 36.41	20.45

CARP1051-001 05/01/2014

FULTON, HANCOCK, KNOX, LOGAN, MASON, MCDONOUGH, WARREN, AND WOODFORD COUNTIES

	Rates	Fringes
MILLWRIGHT	$ 30.80	23.23

CARP1051-003 05/01/2014

ADAMS, BROWN, CASS, GREENE, MACOUPIN, MENARD, MONTGOMERY, MORGAN, PIKE, SCHUYLER, AND SCOTT COUNTIES

	Rates	Fringes
MILLWRIGHT	$ 30.72	22.69

CARP1051-007 05/01/2014

LIVINGSTON AND MCLEAN COUNTIES

	Rates	Fringes
MILLWRIGHT	$ 30.80	23.29

CARP2158-001 06/01/2014

BOONE, BUREAU, CARROLL, DEKALB, HENDERSON, HENRY, JO DAVIESS, LA SALLE, LEE, MARSHALL, MERCER, OGLE, PUTNAM, ROCK ISLAND, STARK, STEPHENSON, WHITESIDE, AND WINNEBAGO COUNTIES

	Rates	Fringes
MILLWRIGHT		
Boone, Jo Daviess, Ogle, Stephenson, and Winnebago Counties	$ 36.70	23.67
Bureau, DeKalb, La Salle, Lee, Marshall, Putnam, Rock Island (West), Stark, and Whiteside Counties	$ 36.12	24.42
Carroll, Henderson, Henry, Mercer, and Rock Island (East) Counties	$ 27.89	20.92

ELEC0034-001 01/01/2015

PEORIA DIVISION - MARSHALL (Area West of Bell Plain & Roberts TWPS) AND WOODFORD (Area West of Kansas, Linn, Palestine & Roanoke TWPS) COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 34.66	17.93

ELEC0034-002 01/01/2015

GALESBURG DIVISION - FULTON (Cass, Deerfield, Ellisville, Harris, Lee, Union, Young, & Hickory TWPS), HENDERSON, KNOX, MCDONOUGH (Blandinsville, Prairie City, Emmet, Tennessee, Scotland, Sciota, Bushnell, Chalmers TWPS), MERCER (Ohio Grove, Suez, & North Henderson TWPS) AND WARREN COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 29.90	17.17

ELEC0034-003 01/01/2015

QUINCY DIVISION - ADAMS, BROWN, HANCOCK, MCDONOUGH (Lamoine, Bethel, Industry & Eldorado), PIKE, AND SCHUYLER COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 28.36	15.56

ELEC0034-005 01/01/2015

PEORIA DIVISION - FULTON (Except Cass, Deerfield, Ellisville, Harris, Lee, Union, Young, & Hickory TWPS); MASON (Except Bath, Crane, Creek, Kilbourne, Lynchburg, Mason City, and Salt CREEK TWPS); AND STARK (Essex, Valley & West Jersey TWPS) COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 34.66	17.93

ELEC0034-014 01/01/2015

BUILDING

QUINCY DIVISION - ADAMS, BROWN, FULTON, HANCOCK, HENDERSON, KNOX, MARSHALL Westside), MASON (Northside), MCDONOUGH, MERCER (Southeast side), PEORIA, PIKE, SCHUYLER, STARK (Southside), TAZWELL, WARREN, WOODFORD (Westside) COUNITES

	Rates	Fringes
ELECTRICAL LOW VOLTAGE WIRING INSTALLER Installation, service and maintenance of low-voltage systems which utilizes the transmission and/or transference of voice, sound, vision, or digital for commercial, education, security and entertainment purposes for the following: TV monitoring and surveillance,		

background/foreground
music, intercom and
telephone interconnect,
field programming,
inventory control systems,
microwave transmission,
multi-media, multiplex,
radio page, school,
intercom and sound burglar
alarms and low voltage
master clock systems.....$ 28.00 17.04

ELEC0145-002 06/02/2014

CARROLL (Chadwick, Mt. Carroll, Savanna and Thompson TWPS), HENRY (Except Annawan, Burns, Cambridge, Galva, Kewanee, Weller, and Westerfield TWPS), JO DAVIESS (Savanna Ordanance Depot), MERCER (Except Ohio Grove, North Henderson, & Suez), WHITESIDE (Remainder), and ROCK ISLAND COUNTIES

	Rates	Fringes
CABLE SPLICER	$ 34.00	19.31
ELECTRICIAN	$ 33.00	19.23

ELEC0176-002 06/01/2014

BUREAU, HENRY (Anawan, Burns, Cambridge, Galva, Kewanee, Weller, and Westerfield TWPS), LA SALLE (Deer Park, Eden, La Salle, Peru, Utica, Ottawa, Seneca & Vermilion TWPS), PUTNAM (Granville, Hennepin & Senachwine TWPS) and STARK (Elmira, Goshen, Oseola, Penn, and Toulon TWPS) COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 38.45	31.81

ELEC0176-013 06/01/2014

BUREAU, HENRY (Anawan, Burns, Cambridge, Calva, Kewanee, Weller, and Westerfield TWPS), LA SALLE (Deer Park, Eden, La Salle, Peru, Utica, Ottawa, Seneca, & Vermilion TWPS), PUTNAM (Granville, Hennepin, & Senachwine TWPS), & STARK (Elmira, Goshen, Oseola, Penn, and Toulon TWPS) COUNTIES

	Rates	Fringes
CATV Installer	$ 31.25	26.54

ELEC0193-001 01/01/2015

CASS, LOGAN, MACOUPIN (Athenville, Scottville, Girard & area North thereof), MASON (Lynchburg, Bath, Kilbourne, Crane Creek, Salt Creek & Mason TWPS), MENARD, MONTGOMERY (Bois D Arc, Pitman, & Harvel TWPS), MORGAN, and SCOTT COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 34.34	15.65

ELEC0193-012 01/01/2015

BUILDING

CASS, LOGAN, MACOUPIN (Northside), MASON (Southside), MENARD, MORGAN, MONTOGOMERY (Northwest side), SCOTT, and SANGAMON COUNTIES

	Rates	Fringes
ELECTRICAL LOW VOLTAGE WIRING INSTALLER Installation, service and maintenance of low-voltage systems which utilizes the transmission and/or transference of voice, sound, vision, or digital for commercial, education, security and entertainment purposes for the following: TV monitoring and surveillance, background/foreground music, intercom and telephone interconnect, field programming, inventory control systems, microwave transmission, multi-media, multiplex, radio page, school, intercom and sound burglar alarms and low voltage master clock systems	$ 30.87	14.18

ELEC0197-001 01/01/2015

MC LEAN (Except Anchor, Belleflower, Cropsey, Cheney Grove TWPS) and WOODFORD (Palestine, El Paso & Kansas TWPS) COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 35.15	17.03

ELEC0197-007 09/01/2013

BUILDING

DEWITT (Northside), WESTERN (Northside), MCLEAN (Southside), and WOODFORD (Southside) COUNTIES

	Rates	Fringes

ELECTRICAL LOW VOLTAGE WIRING
INSTALLER
Installation, service and maintenance of low-voltage systems which utilizes the transmission and/or transference of voice, sound, vision, or digital for commercial, education, security and entertainment purposes for the following: TV monitoring and surveillance, background/foreground music, intercom and telephone interconnect, field programming, inventory control systems, microwave transmission, multi-media, multiplex, radio page, school, intercom and sound burglar alarms and low voltage master clock systems.....$ 29.81 14.34

ELEC0309-001 08/25/2014

BOND (Western Half), CLINTON (Except Huey, Hoffman, and vicinity), MACOUPIN (Except Brighton TWP, Athenville, Scottville, Girard, and area North thereof), MONROE, MONTGOMERY (West of Butler Grove, Isham, & Raymond TWPS), RANDOLPH (Red Bud TWP), and WASHINGTON (Venedy TWP) COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 38.45	18.66

ELEC0309-012 09/01/2014

BUILDING

BOND (Westside), CLINTON (Westside), MACOUPIN (Central and Southeast sides), MADISON (Southeast side), MONROE (Westside), MONTGOMERY (Northwest side), RANDOLPH, ST. CLAIR, AND WASHINGTON (Northwest side) COUNTIES

	Rates	Fringes
ELECTRICAL LOW VOLTAGE WIRING INSTALLER Installation, service and maintenance of low-voltage systems which utilizes the transmission and/or transference of voice, sound, vision, or digital for commercial, education, security and entertainment		

purposes for the
following: TV monitoring
and surveillance,
background/foreground
music, intercom and
telephone interconnect,
field programming,
inventory control systems,
microwave transmission,
multi-media, multiplex,
radio page, school,
intercom and sound burglar
alarms and low voltage
master clock systems.....$ 32.15 11.99

ELEC0364-001 06/01/2014

BOONE, CARROLL (Cherry Grove, Shannon, Rock Creek, Lina, Wysox & Elkhorn Grove TWPS), DEKALB (Franklin, Kingston, Genoa, South Grove, Mansfield, DeKalb, Corland, Milan, Alton Pierce, Shabbona Mayfield, Sycamore, Malta, Paw Paw, Squaw Grove, Victor, & Somonauk TWPS), JO DAVIESS (Warren & Rush), LEE, OGLE, STEPHENSON, WHITESIDE (Genesee, Jordan, Hopkins, Sterling, Hume, Montgomery, Tampico, & Hahnaman TWPS), AND WINNEBAGO COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 42.96	28.72

ELEC0461-001 01/05/2015

DE KALB COUNTY (Sandwich TWP)

	Rates	Fringes
ELECTRICIAN	$ 45.95	25.05

ELEC0461-004 11/03/2014

DE KALB COUNTY (Sandwich Twp)

	Rates	Fringes
ELECTRICIAN (ELECTRICAL TECHNICIAN)	$ 38.62	22.35

Work includes the installation, maintenance and removal of telecommunication facilities (voice, sound, data and video), telephone, security, fire alarm systems that are a component of a multiplex system and share a common cable, and data inside wire, interconnect, terminal equipment, central office, PABX and equipment, micro waves, V-SAT, bypass, CATV, WAN, (wide area networks), LAN (Local area networks), and ISDN (integrated system digital network).The work shall cover the pulling of wire in raceways, but not the installation of raceways.

ELEC0538-007 09/01/2013

BUILDING

IROQUOIS (Southeastern side), and VERMILION COUNTIES

	Rates	Fringes
ELECTRICAL LOW VOLTAGE WIRING INSTALLER Installation, service and maintenance of low-voltage systems which utilizes the transmission and/or transference of voice, sound, vision, or digital for commercial, education, security and entertainment purposes for the following: TV monitoring and surveillance, background/foreground music, intercom and telephone interconnect, field programming, inventory control systems, microwave transmission, multi-media, multiplex, radio page, school, intercom and sound burglar alarms and low voltage master clock systems	$ 30.58	13.57

ELEC0601-003 01/01/2015

LA SALLE (Remainder), LIVINGSTON, MCLEAN (Cropsey, Anchor, Cheney Grove, & Belleflower TWPS), MARSHALL (Roberts, Evans, Bell, Plaine, & Bennington), PUTNAM (Magnolia TWP), and WOODFORD (Linn, Clayton, Minonk, Roanoke, Green, & Panola TWPS) COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 36.33	15.21

ELEC0601-010 09/01/2013

BUILDING

CHAMPAIGN, DEWITT (Northeast side), DOUGLAS (Northeast side), FORD (Southside), IROQUIOS (Southwest side), LASALLE (Southside), LIVINGSTON, MARSHALL (Eastside), PIATT (Northeast side), PUTNAM (Southeast side), and WOODFORD (Northeast side) COUNTIES

	Rates	Fringes
ELECTRICAL LOW VOLTAGE WIRING		

INSTALLER.....$ 30.58 13.57

Installation, service and maintenance of low-voltage systems which utilizes the transmission and/or transference of voice, sound, vision, or digital for commercial, education, security and entertainment purposes for the following: TV monitoring and surveillance, background/foreground music, intercom and telephone interconnect, field programming, inventory control systems, microwave transmission, multi-media, multiplex, radio page, school, intercom and sound burglar alarms and low voltage master clock systems.

ELEC0649-001 01/01/2015

CALHOUN, GREEN, JERSEY, AND MACOUPIN (Brighton TWP) COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 38.73	20.80

ELEC0649-007 09/01/2014

BUILDING

CALHOUN, GREENE, JERSEY, MADISON (Northwest side), MACOUPIN (Southwest side) COUNTIES

	Rates	Fringes
ELECTRICAL LOW VOLTAGE WIRING INSTALLER Installation, service and maintenance of low-voltage systems which utilizes the transmission and/or transference of voice, sound, vision, or digital for commercial, education, security and entertainment purposes for the following: TV monitoring and surveillance, background/foreground music, intercom and telephone interconnect, field programming, inventory control systems, microwave transmission, multi-media, multiplex, radio page, school, intercom and sound burglar alarms and low voltage master clock systems.	$ 30.05	15.00

ELEC0702-007 01/01/2015

BOND (Eastern Half), CLINTON (Huey, Hoffman, & vicinity), RANDOLPH (Except Red Bud TWP), AND WASHINGTON (Except Venedy

TWP) COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 40.94	18.38

ELEC0702-016 01/01/2015

BUILDING

ALEXANDER, BOND (Eastside), CLAY, CLINTON (Eastside), EDWARDS, EFFINGHAM (Southwestern side), FAYETTE (Southside), FRANKLIN, GALLATIN, HAMILTON, HARDIN, JACKSON, JEFFERSON, JOHNSON, MARION, MASSAC, PULASKI, PERRY, POPE, RANDOLPH (Southeastern side), SALINE, UNION, WASHINGTON (Southeastern side), WAYNE, WHITE, and WILLIAMSON COUNTIES

	Rates	Fringes
ELECTRICAL LOW VOLTAGE WIRING INSTALLER	$ 33.44	11.51

Installation, service and maintenance of low-voltage systems which utilizes the transmission and/or transference of voice, sound, vision, or digital for commercial, education, security and entertainment purposes for the following: TV monitoring and surveillance, background/foreground music, intercom and telephone interconnect, field programming, inventory control systems, microwave transmission, multi-media, multiplex, radio page, school, intercom and sound burglar alarms and low voltage master clock systems.

ELEC0704-002 06/01/2014

JO DAVIESS COUNTY (Except Savanna Ordnance Depot & area East of Apple River, Thompson & Woodbine TWPS)

	Rates	Fringes
ELECTRICIAN	$ 29.70	15.03

---

* ELEV0003-003 01/01/2015

BOND, CALHOUN, CLINTON, GREENE, JERSEY, MACOUPIN, MONROE, MONTGOMERY, RANDOLPH, AND WASHINGTON COUNTIES

	Rates	Fringes
ELEVATOR MECHANIC	$ 45.09	28.39+a+b

FOOTNOTES:

a) Employer contributes 8% of regular basic hourly rate as as vacation pay credit for employees with more than 5 years of service, and 6% for less than 5 years of service

b) Eight paid holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day Friday after Thanksgiving Day, Veterans' Day and Christmas Day.

---

* ELEV0033-003 01/01/2015

BUREAU, HENRY, MERCER, ROCK ISLAND, and WHITESIDE COUNTIES

	Rates	Fringes
ELEVATOR MECHANIC	$ 40.47	28.39+a+b

FOOTNOTES:

A. Employer contributes 8% of regular basic hourly rate as vacation pay credit for employees with more than 5 years of service, and 6% for employees with less than 5 years of service.

B. PAID HOLIDAYS: New Year's Day; Memorial Day; Independence Day; Labor Day; Veteran's Day; Thanksgiving Day; Day after Thanksgiving; & Christmas Day.

---

* ELEV0055-002 01/01/2015

FULTON, HENDERSON, KNOX, LA SALLE, LIVINGSTON, MARSHALL, MCDONOUGH, MCLEAN, PUTNAM, STARK, WARREN, AND WOODFORD COUNTIES

	Rates	Fringes
ELEVATOR MECHANIC	$ 41.69	28.39+A+B

FOOTNOTES:

A. Employer contributes 8% of regular basic hourly rate as vacation pay credit for employees with more than 5 years of service, and 6% for under 5 years of service.

B. Paid Holidays: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Day after Thanksgiving; Veterans' Day & Christmas Day

---

ELEV0092-001 05/01/2002

ADAMS, BROWN, CASS, HANCOCK, LOGAN, MASON, MENARD, MORGAN, PIKE, SCHUYLER, AND SCOTT COUNTIES

	Rates	Fringes
ELEVATOR MECHANIC	$ 26.615	7.455+A&B

FOOTNOTES:

A. Employer contributes 8% of regular basic hourly rate as

vacation pay credit for employees with more than 5 years of service, and 6% for 6 months to 5 years of service.

B. EIGHT PAID HOLIDAYS: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Day after Thanksgiving; Veterans' Day and Christmas Day.

---

* ELEV0132-002 01/01/2015

BOONE, CARROLL, DE KALB, JO DAVIESS, LEE, OGLE, STEPHENSON, and WINNEBAGO COUNTIES

	Rates	Fringes
ELEVATOR MECHANIC	$ 46.83	28.39+a+b

FOOTNOTES:

A. Employer contributes 8% of regular basic hourly rate as vacation pay credit for employees with more than 5 years of service, and 6% for under 5 years of service.

B. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, Veterans' Day and Christmas Day.

---

* ENGI0150-003 06/01/2014

BOONE, CARROLL, DE KALB, JO DAVIESS, LEE, OGLE, STEPHENSON, WHITESIDE, AND WINNEBAGO COUNTIES

	Rates	Fringes
OPERATOR: Power Equipment		
GROUP 1	$ 42.80	31.80
GROUP 2	$ 42.10	31.80
GROUP 3	$ 39.65	31.80
GROUP 4	$ 37.65	31.80

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Mechanic; Asphalt Plant*; Asphalt Spreader; Autograde*; Backhoes with Caisson attachment*: Batch Plant*; Benoto(Requires two Engineers); Boiler and Throttle Valve; Caisson Rigs*; Central Redi-Mix Plant*; Combination Backhoe Front Endloader Machine; Compressor and Throttle Valve; Concrete Breaker (Truck Mounted)*; Concrete Conveyor; Concrete Conveyor, Truck Mounted; Concrete Paver over 27E cu. ft.*; Concrete Paver 27E cu ft and Under*; Concrete Placer*; Concrete Placing Boom; Concrete Pump (Truck Mounted); Concrete Tower; Cranes*; Cranes, Hammerhead*; Cranes, (GCI and similar type Requires two operators only); Creter Crane; Crusher, Stone, etc; Derricks; Derricks, Traveling*; Formless Curb and Gutter Machine*; Grader, Elevating; Grouting Machines; Highlift Shovels or Front Endloader 2 1/4 yd. and over; Hoists,

Elevators, Outside Type Rack and pinion and similar Machines; Hoists, One, Two, and Three Drum; Hoists, Two Tugger One Floor; Hydraulic Backhoes*; Hydraulic Boom Trucks; Hydraulic Vac (and similar equipment);Locomotives; Motor Patrol*; Pile Drivers amd Skid Rig*; Post Hole Digger; Pre- Stress Machine; Pump Cretes Dual Ram(Requiring frequent Lubrication and Water); Pump Cretes; Squeeze Cretes-Screw Type Pumps Gypsum Bulker and Pump; Raised and Blind Hole Drill*; Roto Mill Grinder (36" and Over)*; Roto Mill Grinder (Less Than 36")*; Scoops-Tractor Drawn; Slip-Form Paver*; Straddle Buggies; Tournapull; Tractor with Boom, and Side Boom; and Trenching Machines*.

GROUP 2: Bobcat (over 3/4 cu yd); Boilers; Brick Forklift; Broom, Power Propelled; Bulldozers; Concrete Mixer (Two Bag and over); Conveyor, Portable; Forklift Trucks; Greaser Engineer; Highlift Shovels or Front End loaders under 2 1/4 cu yd; Aotomatic Hoists, Hoists, Inside Elevators; Hoists, Sewer Dragging Machine; Hoists, Tugger Single Drum; Laser Screed; Rock Drill (Self-Propelled); Rock Drill (Truck Mounted)*; Rollers; Steam Generators; Tractors; Tractor Drawn Vibratory Roller (Receives an additional $.50 per hour); Winch Trucks with "A" Frame.

GROUP 3: Air Compressor-Small 185 and Under (1 to 5 not to exceed a total of 300 ft); Air Compressor-Large over 185; Combination-Small Equipment Operator; Generator- Small 50 kw and under; Generator-Large over 50 kw; Heaters, Mechanical; Hoists, Inside Elevators (Remodeling or Renovatin work); Hydrualic Power Units (Pile Driving, Extracting, and Drilling); Low Boys; Pumps Over 3" (1 To 3 not to exceed a total of 300 ft); Pumps, Well Points; Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches; Bobcat (up to and including 3/4 cu yd)

GROUP 4 - Oilers; Hoists; Inside Elevators; Push Button Automatic Doors

*-Requires Oiler

PREMIUM PAY:

Long Boom: Cranes & Derricks 90' to 150' including jib receive an extra $.50 per hour. Cranes & Derricks over 150' including jib receive an extra $.50 per hour plus an additional $.10 for each additional 10' of boom or jib.

Capacity Pay: Cranes & Derricks with maximum capacity exceeding 50 ton with less than 90' of boom or jib shall be compensated $.01 per hour for each ton of the rated capacity in excess of 50 ton.

Long Boom pay and Capacity pay cannot be combined.

Crane mounted earth auger, raised and blind hole drills, and truck mounted drill rigs receive an extra $.50 per hour.

Creter Cranes: When the Creter Crane is equipped with a conveyor system capable of extending 70' or more, the engineer shall receive an extra $.50 per hour.

Truck Mounted Concrete Pumps: When the Truck Mounted Concrete Pump is equipped with a boom, which is capable of extending 90' or more, the engineer shall receive $.50 per hour extra.

Truck Mounted Concrete Conveyor: Truck Mounted Concrete Conveyors equipped with conveyors that are capable of extending 90' or more, the engineer shall receive an extra $.50 per hour.

Underground Work: Employees working in tunnels, shafts, etc. shall be paid an additional $.40 per hour. Employees working under air pressure 1/2 pound to 7 pounds shall receive an additional $.50 per hour. Employees working under air pressure of 7 pounds or over shall receive $.65 per hour more.

Mining Machines-Boring Machines: The crew operating and maintaining the Mining Machines shall be compensated an additional $.50 per hour.

---

* ENGI0150-005 06/01/2014

BUREAU (East and North of RT. 26), LA SALLE, LIVINGSTON, AND PUTNAM (East & South of the Illinois River) COUNTIES

	Rates	Fringes
OPERATOR: Power Equipment		
Group 1	$ 45.30	32.05
Group 2	$ 44.00	32.05
Group 3	$ 41.45	32.05
Group 4	$ 39.70	32.05

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Mechanic; Asphalt Plant*; Asphalt Spreader; Autograde*; Backhoes with Caisson Attachment*; Batch Plant*; Benoto (Requires two Engineers); Boiler and Throttle Valve; Caisson Rigs*; Central Redi-Mix Plant*; Combination Backhoe Frontend Loader; Compressor and Throttle Valve; Concrete Breaker (Truck Mounted)*; Concrete Conveyor; Concrete Paver over 27E cu ft*; Concrete Paver 27E cu ft and under; Concrete Placer*; Concrete Pump Truck Mounted; Concrete Tower; Cranes; Cranes, Hammerhead*; Creter Crane; Crusher, Stone, etc; Derricks; Derricks, Traveling; Formless Curb and Gutter Machine*; Grader, Elevating; Grouting Machines; Highlift Shovels or Frontend Loader 2 1/4 yd and over; Hoists, Elevators, Outside Type Rack and Pinion and Similar; Hoists, One, Two, and Three Drums; Hoists, Two Tugger One Floor; Hydraulic Backhoes; Hydraulic Boom Trucks; Hydro Vac (and similar equipment); Locomotive; Motor Patrol; Pile Drivers and Skid Rig; Post Hole Digger; Prestress Machine; Pump Crete Dual Ram (requiring frequent lubrication and water)*; Pump Cretes; Squeeze Cretes Screw Type Pumps Gypsum Bulker and Pump; Roto Mill Grinder 36" and over*; Roto Mill Grinder less

than 36"; Scoops-Tractor Drawn; Slip-Form Paver*; Straddle Buggies; Tournapull; Tractor with Boom and Side Boom; Trenching Machines

GROUP 2: Boiler; Broom, All Power Propelled; Bulldozers; Concrete Mixer 2 Bag and over; Conveyor, Portable; Forklift Trucks; Greaser Engineer; Highlift Shovel or Front end Loader under 2.25 cu yd; Hoists, Automatic; Hoists, Inside Freight Elevators; Hoists, Sewer Dragging Machine; Hoists, Tugger Single Drum; Laser Screed; Rock Drill (Self-Propelled); Rock drill (Truck Mounted)*; Rollers; Steam Generators; Tractors; Tractor Drawn Vibratory Roller (additional .50/hr); A-Frame Winch Trucks

GROUP 3: Air Compressor, Small 250 and under (1 to 5 not to Exceed a Total of 300 ft; Air Compressor, Large over 250; Combination Small Equipment Operator; Generator, Small 50 kw and under; Generator, Large over 50 kw; Heaters, Mechanical; Hoists, Inside Elevators (Rheostat Manual Controlled); Hydraulic Power Units, (Pile Driving and Extracting); Lowboys; Pumps over 3" (1 to 3 not to exceed a total of 300 ft); Pumps, Well Points; Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches

GROUP 4: Bobcat/Skid Steer Loader; Boom Trucks (Residential); Brick Forklift; Hoists, Inside Elevators Push Button with Automatic Doors; Oilers

*Requires an Oiler

ENGI0150-019 06/01/2014

HENRY (Western Half), MERCER, ROCK ISLAND, and WHITESIDE (Western part from the 5th Sectional Line East of Morrison running directly North and South) COUNTIES

	Rates	Fringes
OPERATOR: Power Equipment		
GROUP 1	$ 32.00	27.65
GROUP 2	$ 31.00	27.65
GROUP 3	$ 28.35	27.65
GROUP 4	$ 27.30	27.65

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Crane (Friction or Hydraulic, regardless of size or attachments); Tow or Push Boat

GROUP 2: Asphalt Heater-Planer Unit; Asphalt Paver; Asphalt Paver Screed; Asphalt Plant; Automatic Curbing Machine; Backfiller (throw bucket); Blastholer Self-Propelled Rotary Drill or Similar Machines; Boom Tractor or Side Boom; Boring Machine (Directional, Vertical or Horizontal); Building Hoist (1,2 or 3 drums); Caisson Auguring Machines; Central Redi-Mix Plant; Chip Spreader; Cleaning & Priming Machine; Combination Backhoe Front End Loader; Combination Concrete Finishing Machine and Float; Concrete Breaker or

Hydro-Hammer; Concrete Conveyor or Pump; Concrete Paver; Concrete Spreader; Concrete Wheel Saw (Large self-propelled); Crusher (Stone, Concrete, Asphalt, etc.); Curing-Tinning Machine; Dipper Dredge Crane man; Dipper Dredge Operator; Dual Purpose Truck (Boom, Winch, etc.); Excavator; Farm-Type Tractor Operating Scoop or Scraper or with Power Attachment; Forklift (6000 lb. capacity); Grader, Motor Grader, Motor Patrol, Auto Grader, Form Grader, Pull Grader, Sub Grader, Elevating Grader; Group Equipment Greaser; Guard Rail Post Driver; Hoists; Hydraulic Dredge Leverman or Engineer; Hydro-Vac Truck Mounted or Pull Type, and Similar Equipment; Laser Screed; Loader (Track, Rubber Tire or Articulated); Locomotive Engineer; Mechanic-Welder; Mechanical Loaded Log Chippers or Similar Machines; Milling Machine; Mucking Machine; Pile Driver; Pipe Bending; Pug Mill; Road Widener-Shoulder Spreader; Scraper (self-propelled); Self-Propelled Roller or Tire Roller (on Asphalt or Blacktop), Sheep Foot or Pad Foot Compactor; Shovel; Slip Form Paver; Steel Track-Type Tractor (Dozer, Push Cat, etc.); Transfer or Shuttle Buggy; Trenching Machine (40 H.P. & over); Work Boat.

GROUP 3: Articulated Off-Road Haul Unit; Asphalt Booster; Boiler (Engineer or Fireman); Conveyor Over 20 H.P.; Distributor; Driver on Truck Crane or Similar Machines; Elevator; Farm-Type Tractor (Without Power Attachment); Fireman & Pump Operator at Asphalt Plant; Forklift (Less than 6000 lb. capacity); Grout Pump; Light Plant; Mechanical Broom; Mud Jack; Self-Propelled Roller (Other than listed in Group 2); Straddle Carrier; Trench Machine (Under 40 H.P.).

GROUP 4: Air Compressor (400 C.F.M. or over); Compact Loader (Rubber Tire, Track & Utility); Engine Driven Welding Machine; Mechanical Heater (other than steam boiler); Small Outboard Motor Boat (Safety Boat & Life Boat); Water Pump (More than one well point pump).

ENGI0520-001 08/01/2013

BOND, CALHOUN, CLINTON, GREENE, JERSEY, MACOUPIN, MONROE, MONTGOMERY, RANDOLPH, and WASHINGTON COUNTIES

	Rates	Fringes
OPERATOR: Power Equipment		
Group 1	$ 33.20	28.20
Group 2	$ 27.59	28.20
Group 3	$ 27.65	28.20
Group 4	$ 27.32	28.20
Group 5	$ 34.75	28.20
Group 6	$ 35.05	28.20
Group 7	$ 35.33	28.20

GROUP 1: Cranes; Draglines; Shovels; Skimmer Scoops; Clamshells or Derrick Boats; Piledrivers; Crane-type Backhoes; Asphalt Plant Op; Concrete Plant Operator; Dredges; Asphalt Spreading Machines; Locomotives; Cableways

or Tower Machines; Hoists; Hydraulic Backhoes; Ditching Machines or Backfiller; Cherry Pickers; Overhead Crane; Roller; Concrete Paver; Concrete Breakers & Pumps; Bulk Cement Plants; Cement Pumps; Derrick Type Drills; Boat Operators; Motor Graders or Pushcats; Scoops or Tournapulls; Bulldozers; Eneloaders or Forklifts; Power Blade or Elevating Graders; Winch Cats; Boom or Winch Trucks or Boom Tractors, Pipewrapping or Painting Machines; Drills (other than derrick type); Mud Jacks; Well Drilling Machines; Mixers; Conveyors (two); Air Compressors two; Water Pumps regardless of size; Welding Machines two; Siphons or jets two; Winch Heads or Apparatus Two; Light Plants two; Tractors regardless of size Straight (tractor only); Firemen on Stationary Boilers; Automatic Elevators; Form Grading Machines; Finishing Machines; Power Sub-Grader or Ribbon Machine; Longitudinal Floats; Distribution Operator on Trucks; Winch Heads or Apparatuses (1); Excavators; Mobile Track Air and Heater (two to five); Heavy Equipment Greaser and all other Operators not listed below.

GROUP 2: Air Compressor One; Water Pump regardless of size one; Welding Machine One; 1-Bag Mixer One; Conveyor One; Siphon or Jet; Light Plant One; Heater One; Immobile Track Air One.

GROUP 3: Firemen on Whirlies and Asphalt Spreader Oilers; Heavy Equipment Oilers; Truck Cranes; Monigans; Large (Over 65 ton rated Capacity); Concrete Plant Oiler and Black Top Plant Oiler.

GROUP 4: Oilers

GROUP 5: Operators on equipment with Booms, including Jibs, 100 ft and over, but less than 150 ft.

GROUP 6: Operators on equipment with Booms, including jibs, 150 feet and over, but less than 200 feet.

GROUP 7: Operators on Equipment with Booms, including jibs, 200 Feet and over; Tower Cranes and Whirley Cranes.

ENGI0649-001 05/01/2014

BUREAU (West of RT. 26), FULTON, HANCOCK, HENDERSON, HENRY (Eastern Half), KNOX, MARSHALL, MASON, MCDONOUGH, MCLEAN, PUTNAM (West of Illinois River), STARK, WARREN, and WOODFORD COUNTIES

	Rates	Fringes
OPERATOR: Power Equipment		
Group 1	$ 37.05	27.48
Group 2	$ 34.45	27.48
Group 3	$ 30.16	27.48

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Overhead Cranes; Gradall; All Rough Terrain Hydraulic Cranes (Cherry Pickers) 91,000 lbs gross vehicle weight and over require an oiler; Mechanics; Central Concrete Mixing Plant Operator; Road Pavers (Single Drum, Dual Drum, Tri-batchers); Blacktop Plant Operators and Plant Engineers; 3-Drum Hoist; Derricks; Hydro Cranes (non-lattice boom truck cranes having three (3) axles or less shall not require an oiler, a dolly shall count as an axle); Shovels; Skimmer Scoops; Koehring Scooper; Draglines; Backhoe; Derrick Boats; 360" Swing Excavators; Locomotive Cranes; Dredge (all types); Guard Rail Machines (machines that cannot be moved forward from the post pounder seat requires an oiler); Motor Patrol; Power Blades-Dumore-Elevating and Similar Types; Tower Cranes (Crawler-Mobile) and Stationary; Crane-Type Back-Filler; Drott Yumbo and Similar Types Considered as Cranes; Caisson Rigs; Dozer; Tournadozer; Work Boats; Ross Carrier; Tunnel Boring Machine (shall require an oiler); Carts/haul units for a boring machine; Helicopter; Tournapulls - All and Similar Types; Scoops (all sizes); Pushcats; Endloaders (all types); Asphalt Surfacing Machine; Slip Form Paver; Rock Crusher; Heavy Equipment Greaser; CMI, CMI Belt Placer, Auto Grade & 3 Track and Similar Types; Side Booms; Multiple Unit Earth Movers: .75 cents per hr., for each Scoop over one (1); Creter Crane; Trench Machine; Pumpcrete-Belt Crete- Squeeze Cretes-Screw-Type Pumps and Gypsum, Bulker & Pump- Operator will clean; Formless Finishing Machine; Flaherty Spreader or Similar Types; Screee Man on Laydown Machine; Wheel Tractors (Industrial or Farm-Type w/Dozer-Hoe-Endloader or other attachments); FWD & Similar Types; Vermeer Concrete Saw; Self Propelled Concrete Saw; Material Crusher; Screening Plants; Laser Screed; Span Saw; Lull & Similar Types; Off Road Trucks, Articulating End Dump Vehicles & Similar Types; Concrete & All Recycling Machines

GROUP 2 - Dinkeys; Power Launches; PH One-Pass Soil-Cement Machine (and similar types); Pugmill with Pump; Backfillers; Euclid Loader; Forklifts; Jeeps w/Ditching Machine or other attachments; Tuneluger; Automatic Cement and Gravel Batching Plants; Mobile Drills (Soil Testing) and Similar Types; Gurries and Similar Types; 1 and 2 Drum Hoists (Buck Hoists and similar types); Chicago Boom; Horizontal Boring Machine & Pipe Jacking Machine; Hydro Boom; Dewatering System; Straw Blower; Hydro Seeder; Assistant Heavy Equipment Greaser on Spread; Tractors (Track- Type) without Power Unit Pulling Rollers; Rollers on Asphalt - Brick or Macadam; Concrete Breakers; Concrete Spreaders; Mule Pulling Rollers; Cement Stripper; Cement Finishing Machines & CMI Texture & Reel Curing Machines; Cement Finishing Machine; Barber Green or similar loaders; Vibro Tamper (all similar types) Self- Propelled; Winch or Boom Truck; Mechanical Bull Floats; Mixers over 3 Bags; Tractor Pulling Power Blade or Elevating Grader; Porter Rex Rail; Clary Screed; Truck-Type Oilers with CDL; Fireman; Spray Machine on Paving; Curb Machines; Truck Crane Oilers with CDL; Oil Distributor; Truck-Mounted Saws; All

Elevator, permanently installed used for hoisting or lowering building material; Construction Elevator temporarily installed

GROUP 3 - Air Compressor; Herman Nelson Heater, Dravo, Warner, Silent Glo, and similar types; Water Pump(s); Light Plants; Generators; Welding Machines; Power Subgrader; Straight Tractor; Trac Air without attahments; Roller: five (5) ton and under on earth or gravel; Form Grader; Crawler Crane, Skid Rig Oilers & Oilers with CDL; Conveyor (1) or (2); Mixer (3) Bag and under(Standard Capacity with skip); Bulk Cement Plant; Oiler on Central Concrete Mixing Plant; Stud Welder

---

ENGI0965-001 05/01/2014

ADAMS, BROWN, CASS, LOGAN, MENARD, MORGAN, PIKE, SCHUYLER, and SCOTT COUNTIES

	Rates	Fringes
Operating Engineers:		
Group 1	$ 34.10	20.40
Group 2	$ 31.75	20.40
Group 3	$ 28.15	20.40
Group 4	$ 35.60	20.40

PREMIUM PAY -

CRANES WITH BOOMS 120-200 ft. 1.00 per hour;

.02 Per Foot for each foot above 200

MULTIPLE UNIT MACHINE - 1.00 per hour;

UNDERGROUND WORK - 1.00 per hour;

UNDER AIR PRESSURE - 1.00 per hour;

HAZARDOUS WASTE OR ASBESTOS REMOVAL PROJECTS - 1.00 per hour for Level C work;

1.50 per hour for Level B work;

2.00 per hour for Level A work;

LONG BOOM ON A STATIONARY CRANE 1.00 per hour above long Boom Scale

Level A: (highest level of repiratory, skin, and eye protection)

Level B: (same as Level A, but a lower level of skin protection)

Level C: (same as Level B, but a lower level of respiratory protection)

OPERATING ENGINEER CLASSIFICATIONS:

GROUP 1: Asphalt Plant Engineer; Asphalt screed man; Apsco concrete spreader; Asphalt paver; Asphalt roller on bituminous contrete; Athey loaders; Cableways; Cherry Picker; Clam Shell; C.M.I. & Similar Type Autograde Formless Paver, Autgrade Placer & Finisher; Concrete Breaker; Concrete plant Operator; Concrete Pumps; Cranes; Derricks; Derrick boats; Draglines; Earth auger boring machine, Elevating Graders; Engineers on dredge; Gravel processing machines; Head equipment greaser; High lift or fork lift; Hoist with two drums or 2 or more loadlines; Locomotive; Mechanics; Motor graders or auto patrols; Operators or levelman on dredges; Power boat oper; Pug mill oper; (Asphalt plat); Orange peels; Overhead cranes; Paving mixer; Piledrivers; Pipe wraper & Painting machines; Push dozers, or Push cats; Rock crusher; Ross carrier or similar machine; Scoops; Skimmers 2 cu yd capacity & Under: Sheep foot roller (self propelled); Shovels; Skimmer; Scoops; Test hole drilling machines; Tower machine; Tower mixer; Track Tupe & Loaders; Track type forklifts or high lifts; Track jacks & Tampers; Trackors; Sideboom; Trenching machine; Ditching machine; Tunnel lugger; Wheel type end loader; Winch cat; Scoops (All or tournapull).

GROUP 2: Asphalt booster & Heater; Asphalt distributor; Asphalt plant fireman; Building Elevator; Bull float or flexplane; Concrete finshing machine; Concrete saw, self propelled; Concrete spreader machine; Gravel or stone spreader, Power operated; Hoist automatic; Hoist with one drum & one load line; Oiler on 2 paving mixers when used in tandem boom or winch truck; Ost hole diggers; Mechanical; Road or street sweeper, Self-propelled; Scissors hoist; Seaman tiller; Straw machine; Vibratory compactor; Well drill machine; & Mud jacks.

GROUP 3: Air compressor, Track or self-propelled; Bulk cement batching- plants; Conveyors; Concrete mixers (Except Plant, Paver, Tower) Firement, Generators; Greasers; Light plants; Mechanical theater; Oilers; Power from graders; Power sub-grader; Pug mill, When used other than asphalt operation; Roolers (Except bituminous); Tractors w/o Power attachments regardless of size or type; Truck crane oiler; & driver (one man); Vibratory hammer; Water pump; Welding machine (one 300 amp or over) Combinations of five of any air compressors; Conveyors, Welding Machines, Water pumps; Light plants or Generators shall be in batteries or with in 300 ft.

Group 4: Lattice Boom crawler crane, Lattice Boom truck crane, Telescopic truck mounted crane, Tower crane.

IRON0046-004 05/01/2013

ADAMS (Southeastern corner), BROWN, CASS, FULTON (Southern tip including Marbletown, Astoria & Summun TWPS), GREENE (Northern Half), LOGAN, MACOUPIN (Northern part), MASON (East of Rt. 136), MENARD, MONTGOMERY (Except Litchfield, Hillsboro & South thereof) MORGAN, PIKE, SCHUYLER (Eastern Half), and SCOTT

COUNTIES

	Rates	Fringes
IRONWORKER	$ 30.00	20.74

IRON0111-003 07/01/2013

CARROLL (Thompson, Savanna & vicinity), HENRY, JO DAVIESS (East Dubuque, Galena, Hanover, & vicinity), KNOX (Galesburg and area North of the City), MERCER (except Southwest Part), ROCK ISLAND, WARREN (includes Northwest Part), and WHITESIDE (Western Half) COUNTIES

	Rates	Fringes
IRONWORKER	$ 29.00	21.01

IRON0112-001 05/01/2014

FULTON (Except Marbletown, Astoria & Summun TWPS), KNOX (area Southeast of Galensburg), LIVINGSTON, MCLEAN (Western Half), MARSHALL (Southwestern corner), MASON (West of Rt. 136), STARK, and WOODFORD COUNTIES

	Rates	Fringes
IRONWORKER	$ 31.81	22.84

IRON0380-002 05/01/2013

MCLEAN COUNTY (Eastern half)

	Rates	Fringes
IRONWORKER	$ 31.61	18.76

IRON0392-001 08/01/2013

BOND, CALHOUN, CLINTON, GREENE (Southern Half), JERSEY, MACOUPIN (Southern Part), MONROE, MONTGOMERY (Litchfield, Hillsboro & South thereof), RANDOLPH, and WASHINGTON COUNTIES

	Rates	Fringes
IRONWORKER	$ 31.50	22.38

IRON0393-001 06/01/2012

DEKALB COUNTY (Southeastern 2/3 including Sycamore and Dekalb)

	Rates	Fringes
IRONWORKER	$ 44.95	27.48

IRON0444-003 06/01/2013

La Salle, Marshall (Except the Southwestern Part), and Putnman Counties

	Rates	Fringes
IRONWORKER	$ 39.50	30.66

IRON0498-001 06/01/2013

BOONE, CARROLL (Except Thompson, Savanna & vicinity.), DEKALB (Except Southeastern 2/3), JO DAVIESS (Except East Dubuque, Galena, Hanover & vicinity), LEE, OGLE, STEPHENSON, WHITESIDE (Cities of Rock Falls, Sterling, West Sterling), and WINNEBAGO COUNTIES

	Rates	Fringes
IRONWORKER	$ 35.09	31.03

IRON0577-007 06/01/2014

ADAMS, HANCOCK, HENDERSON, KNOX (West of Hwy #41), MC DONOUGH, MERCER (Southwest Part), SCHUYLER (Western Half), and WARREN (except Northwest Part) COUNTIES

	Rates	Fringes
IRONWORKER	$ 25.25	18.70

LABO0032-005 05/01/2014

DEKALB and WINNEBAGO COUNTIES

	Rates	Fringes
LABORER	$ 31.13	23.18

LABORER CLASSIFICATIONS

General Laborer: Carpenter Tender, Tool Cribman, Fireman or Salamander Tender, Flagman, Gravel Box Man, Bumpman & Spotter, Form Handler, Material Handler, Fencing Laborer, Cleaning Lumber, Pit Man, Material Checker, Landscaper, Unloading Explosives, Laying of Sod, Planting of Trees, Asphalt Workers With Machine & Layers, Asphalt Plant Laborer, Wrecking, Fire-proofing, Driving Stakes, Stringlines for All Machinery, Window Cleaning, Demolition Worker, Explosive Handling, Trimming & Removal of Trees, Multi-Plate Pipe, Pilot Cars for Traffic Control, Power Rigging

---

LABO0149-003 06/01/2014

BOONE COUNTY

	Rates	Fringes
LABORER		
GROUP 1	$ 38.00	24.40
GROUP 2	$ 38.22	24.40
GROUP 3	$ 38.15	24.40
GROUP 4	$ 34.00	24.40
GROUP 5	$ 38.35	24.40
GROUP 6	$ 38.35	24.40
GROUP 7	$ 38.80	24.40
GROUP 8	$ 39.00	24.40

LABORER CLASSIFICATIONS

GROUP 1: Common Laborer, Bobcat, Forklift

GROUP 2: Power Virbrator

GROUP 3: Torchman (demolition), Mortarman

GROUP 4: Power Tamper

GROUP 5: Jackhammer & Air Spade, Chainsaw, Swinging Stage and Boatswain Chair, Cement Gun Nozzleman, Hod Carrier, Plaster Tender, Tunnel Man, and Tree Surgeon-Topper

GROUP 6: Tile Layers, Bottom Men

GROUP 7: Caisson Laborers, Dynamiters

GROUP 8: Asbestos Abatement Laborers, Toxic and Hazardous Waste Removal Laborers, Dosimeter (any device) Monitoring Nuclear Exposure

---

LABO0196-001 08/01/2014

MONROE COUNTY

	Rates	Fringes
LABORERS		
Group 1	$ 27.21	21.99
Group 2	$ 27.71	21.99

LABORER CLASSIFICATIONS:

GROUP 1 - All classifications not listed below

GROUP 2 - Asbestos Abatement Worker and Hazardous Waste Worker; Lead Base Paint Worker; Dynamite Man

---

LABO0218-003 08/01/2013

Calhoun, Greene, and Jersey Counties

	Rates	Fringes
LABORER		

Group 1	$ 30.54	17.36
Group 2	$ 31.04	17.36
Group 3	$ 32.04	17.36

LABORER CLASSIFICATIONS:

GROUP 1 - All classifications not listed below

GROUP 2 - Asbestos Abatement Worker and Hazardous Waste Worker; Lead Base Paint Worker

GROUP 3 - Dynamite Man

LABO0231-004 05/01/2014

HANCOCK and MCDONOUGH COUNTIES

	Rates	Fringes
ASBESTOS ABATEMENT WORKER	$ 27.54	20.75
LABORER	$ 26.04	20.75

LABO0231-007 05/01/2014

ADAMS COUNTY

	Rates	Fringes
ASBESTOS ABATEMENT WORKER	$ 22.56	20.18
LABORER	$ 21.06	20.18

LABO0231-010 05/01/2014

BUILDING

BROWN, MASON, PIKE, AND SCHUYLER COUNTIES

	Rates	Fringes
ASBESTOS ABATEMENT WORKER	$ 25.50	20.43
LABORER	$ 24.00	20.43

LABO0231-012 05/01/2014

FULTON COUNTY

	Rates	Fringes
LABORER	$ 26.79	21.55

LABO0309-002 05/01/2013

MERCER and ROCK ISLAND COUNTIES

	Rates	Fringes
LABORERS		
GROUP 1	$ 22.34	14.96
GROUP 2	$ 23.84	14.96

GROUP 3.....$ 24.49 14.96

LABORER CLASSIFICATIONS

GROUP 1: General Laborer, Carpenter Tender, Tool Cribman, Salamander Tender, Flagman, Form Handler, Floor Sweeper, Material Handler, Fencing Laborer, Cleaning Lumber, Landscaper, Laying of Sod, Drilling Equipment, Air Compressors, Conveyor Systems, Heaters, Pumps/Water/Concrete/Grout, Dewatering, Waterblasting, Steam Cleaning Machine, Gunnite Machine, Power Equipment, Roller Compactors, Trenching Machines, Planting of Trees, Removal of Trees, Wrecking Laborer, Unloading Explosives, Removal of trees, Wrecking Laborer, Unloading of Re-Bars, Scafford Worker, Signal Man on Crane, Handling of Materials treated with creosote, Kettle Man, Prime Mover or motorized unit used for wet concrete or handling of building materials, Vibrator Operator, Mortar Mixer, Power Tools used under the jurisdiction of Laborers, Sand Points, Gunnite Nozzle Men, Welders, cutters, burners, and torchmen, Chain Saw Operator, Jackhammer and Drill Operators, Paving Breakers, Air Tamping Hammerman, Concrete Saws, Concrete Burning Machine Operator, Coring Machine operator-Hod Carrier and Plasterer Tender, Caisson worker after 6 foot depth, Tunnel Miners, Mixerman (plaster only), Pump Man, Retaining Walls, Culvert Walls, Slope Walls, and Wing Walls

GROUP 2: Dynamite Man, Asbestos Abatement Worker, Hazardous Waste Abatement Work, Lead Base Paint Abatement Worker, and Unloading Explosives

GROUP 3: Concrete Specialist

LABO0338-003 08/01/2014

Macoupin County

	Rates	Fringes
LABORER		
Group 1	$ 30.08	19.12
Group 2	$ 30.58	19.12
Group 3	$ 31.58	19.12

LABORER CLASSIFICATIONS:

GROUP 1 - All classifications not listed below

GROUP 2 - Asbestos Abatement Worker and Hazardous Waste Worker; Lead Base Paint Worker

GROUP 3 - Dynamite Man

LABO0362-002 05/01/2014

MCLEAN COUNTY

	Rates	Fringes
LABORER		
Asbestos Abatement Worker	$ 30.34	18.97
General Laborer	$ 29.34	18.97

LABO0393-001 05/01/2014

BUREAU, LA SALLE, and PUTNAM COUNTIES

	Rates	Fringes
LABORER		
Group 1	$ 29.53	19.42
Group 2	$ 29.93	19.42
Group 3	$ 29.93	19.42
Group 4	$ 30.53	19.42

LABORER CLASSIFICATIONS

GROUP 1: UNSKILLED - All classifications not listed below

GROUP 2: SEMI-SKILLED - Handling of materials treated with oil, creosote, asphalt and/or foriegn material harmful to skin or clothing; Track laborers; Cement handlers; Chloride handlers; Unloading and laborers with Steel Workers and Re-bars; Concrete Workers)wet); Batch Dumpers; Mason Tenders; Kettle and Tar Men; Tank Cleaners; Plastic Installers; Scaffold Workers; Motorized buggies or motorized ubit used for wet concrete or handling of building materials; Laborers with de-watering systems; Sewer workers plus depth; Vibrator Operators; Motor Mixer Operators; Cement Silica, clay, fly ash, lime and plasters, handlers (bulk or bag); Cofferdam workers plus depth; Concrete paving, placing, cutting and tying of reinforcing; Deck hand, dredge hand and shore laborers; Backmen on floating plant; Asphalt workers with machine and layers; Grade checker; Power tools; Driving all stakes, stringlines for all machinery; Setting and building of manholes and catch basins; Stripping of all concrete forms except paving forms; All concrete paving and slope walls, placing, cutting and tying of reinforcing (re-bars and wire mesh)

GROUP 3: SKILLED - Caisson Workers plus depth; Gunnite Nozzle Men; Lead Man on Sewer Work; Welders, Cutters, Burners & Torchmen; Chain Saw Operators; Paving Breaker, Jackhammer & Drill Operators; Layout Man and/or tile layer; Steel Form Setters (Street & Hwy); Air Tamping hammerman; Signal man on Crane; Concrete Saw Operator; Screenman on Asphalt Pavers; Front End Man on Chip Spreader; Laborers tending masons with hot materials or where foreign materials are used; Multiple Concrete duct-leadman; Luteman; Asphalt Raker; Curb Asphalt Machine Operator; Ready mix scalemen, permanent, portable or temporary plant; Laborers handling masterplate or similar materials; Laser Beam Operator; Coring Machine Operator; Plasterer Tenders; Underpinning and Shoring of Building; Material selector when working with firebrick or castable materials; Fire Watch; Signalling of all power equipment; Tree Topper or Trimmer

GROUP 4: Dynamite man; Asbestos Abatement Worker and Hazardous Waste Worker

---

LABO0459-003 08/01/2014

RANDOLPH and WASHINGTON COUNTIES

	Rates	Fringes
LABORERS		
Group 1	$ 27.92	21.28
Group 2	$ 28.42	21.28
Group 3	$ 29.42	21.28

LABORER CLASSIFICATIONS:

GROUP 1 - All classifications not listed below

GROUP 2 - Asbestos Abatement Worker and Hazardous Waste Worker; Lead Base Paint Worker

GROUP 3 - Dynamite Man

LABO0477-001 05/01/2012

MENARD COUNTY

	Rates	Fringes
LABORERS		
Asbestos Abatement Worker	$ 30.36	16.87
General Laborer	$ 28.64	17.76

LABO0477-006 05/01/2012

LOGAN COUNTY

	Rates	Fringes
LABORER		
Asbestos Abatement Worker	$ 30.64	17.86
General Laborer	$ 28.64	17.76

LABO0477-007 05/01/2013

CASS, MORGAN, AND SCOTT COUNTIES

	Rates	Fringes
LABORER		
Asbestos Abatement Worker	$ 28.46	17.86
General Laborer	$ 26.46	17.76

LABO0538-002 05/01/2014

HENDERSON, HENRY, KNOX, WARREN, and STARK (WEST) COUNTIES

	Rates	Fringes
LABORER		
Dynamite Men; Asbestos Abatement Laborer; and Hazardous Waste Worker	$ 28.89	20.26
General Laborer	$ 27.89	20.26

LABO0581-001 08/01/2014

CLINTON COUNTY (Northeast)

	Rates	Fringes
LABORERS		
Group 1	$ 26.25	22.95
Group 2	$ 26.75	22.95

LABORER CLASSIFICATIONS:

GROUP 1 - All classifications not listed below

GROUP 2 - Asbestos Abatement Worker and Hazardous Waste Worker; Lead Base Paint Worker; Dynamite Man

---

LABO0622-001 08/01/2014

BOND COUNTY (Northside)

	Rates	Fringes
LABORERS		
Group 1	$ 25.96	23.00
Group 2	$ 26.46	23.00
Group 3	$ 27.46	23.00

LABORER CLASSIFICATIONS:

GROUP 1 - All classifications not listed below

GROUP 2 - Asbestos Abatement Worker and Hazardous Waste Worker; Lead Base Paint Worker

GROUP 3 - Dynamite Man

LABO0622-003 08/01/2014

BOND COUNTY (Except the Northside)

	Rates	Fringes
LABORERS		
GROUP 1	$ 25.96	23.00
GROUP 2	$ 26.46	23.00
GROUP 3	$ 27.46	23.00

LABORER CLASSIFICATIONS

GROUP 1 - All classifications not listed below

GROUP 2 - Asbestos Abatement Worker and Hazardous Waste Worker; Lead Base Paint Worker

GROUP 3 - Dynamite Man

LABO0670-003 07/02/2014

CLINTON COUNTY (Northwest)

	Rates	Fringes
LABORER		
Group 1	$ 28.00	21.20
Group 2	$ 28.50	21.20
Group 3	$ 29.50	21.20

LABORER CLASSIFICATIONS:

GROUP 1 - All classifications not listed below

GROUP 2 - Asbestos Abatement Worker and Hazardous Waste Worker; Lead Base Paint Worker

GROUP 3- Dynamite Man

LABO0727-001 05/01/2014

CARROLL, JO DAVIESS, LEE, OGLE, STEPHENSON, and WHITESIDE COUNTIES

	Rates	Fringes
LABORER	$ 31.62	22.76

LABORER CLASSIFICATIONS

Carpenter Tender; Tool Cribmen; Firemen or Alamander Tender; Flagman; Gravel Box Men, Dumpmen & Spotters; Form Handlers; Material Handlers; Fencing Laborers; Cleaning Lumber; Pit Men; Material Checkers; Unloading Explosives; Removal of Trees; Ashpalt Workers with Machine & Layers; Asphalt Plant Laborers; Wrecking; Fireproofing; Janitors; Driving Stakes, Stringlines for all Machinery; Window Cleaning; Demolition Worker. Asbestos Abatement Worker; Hazardous Waste Worker; Handling of any Materials with any Foreign Matter Harmful to skin or clothing; Track; Cement Handler; Chloride Handler; Unloading & Laborers with Steel Workers & Rebars; Concrete Workers Wet; Tunnel Tenders in free air; Batch Dumper; Mason Tender; Kettle & Tar Men; Tank Cleaner; Plastic Installer; Scaffold Worker; Motorized Buggies or Motorized Unit used for Wet Concrete or Handling of Building Materials; Laborers with Dewatering Systems; Sewer Workers Plus Depth; Vibrator Operator; Cement Silica, Clay, Fly Ash, Lime & Plasters, Handlers (bulk or bag); Cofferdam Workers Plus Depth; Concrete Paving, Placing, Cutting &

Tying of Reinforcing; Deck Hand, Dredge Hand and Shore Laborers; Bankmen on Floating Plant; Grade Checker; Power Tools; Front End Man on Chip Spreader; Caisson Worker Plus Depth, Gunnite Nozzle Man; Lead Man on Sewer Work; Welders, Cutters, Burners & Torchmen; Chainsaw Operator; Jackhammer & Drill Oper.; Layout Man or Tile Layer; Stee; Form Setter (street & hwy); Air Tamping Hammermen; Signal Man on Crane; Concrete Saw Operator; Screedman on Aspahlt Pavers; Tending Masons with Hot Material or where Foreign Materials are used; Mortar Mixer Operator; Multiple Cconcrete Duct-Leadman; Luteman; Asphalt Raker; Curb Asphalt Machine Operator; Ready Mix Scaleman, Permanent, Portable or Temporary Plant; Laborers Handling Master Plate or similar materials; Laser Beam; Concrete Burning Machine Operator; Coring Machine Operator; Plaster Tender; Underpinning and Shoring of Buildings; Pump Men; Manhole and Catch Basin; Dirt & Stone Tamper; Hose Men on Concrete Pump.

LABO0742-002 08/01/2013

CLINTON COUNTY (Southwest)

	Rates	Fringes
LABORERS		
Group 1	$ 26.00	21.90
Group 2	$ 26.50	21.90
Group 3	$ 27.50	21.90

LABORER CLASSIFICATIONS:

GROUP 1 - All classifications not listed below

GROUP 2 - Asbestos Abatement Worker and Hazardous Waste Worker; Lead Base Paint Worker; Dynamite Man

---

* LABO0996-002 05/01/2013

LIVINGSTON, MARSHALL, STARK (Eastern Half), and WOODFORD COUNTIES

	Rates	Fringes
LABORER		
GROUP 1	$ 29.45	17.56
GROUP 2	$ 30.45	17.56

LABORER CLASSIFICATIONS

GROUP 1: Carpenter tenders; Mason tenders; Plasterers tenders; Mortar mixers; Kettlemen and carrier of hot stuff; Tool crib men; Firmen or salamander tenders; Flagman; Installation and maintenance of temporary gas-fired heating units; Gravel box men; Dumpmen and spotters; Fencing laborers; Cleaning lumber; Pit men; Unloading explosives; Asphalt plant laborers; Fireproofing laborers; Janitors (final clean-up); Handling of materials treated with oil,

creosote, cloride, asphalt, and/or foreign material harmful to skin or clothing; Laborers with dewatering systems; Gunnite nozzle men; Laborers tending masons with hot material or where foreign materials are used; Laborers tending masons with hot material or where foreign materials are used; Laborers handling masterplate or similar materials; Concrete burning machine operator; Material selector men working with fireback or combustable material; Dynamite men; Track laborers; Cement handlers; Chloride handlers; The unloading and laborers with steel workers and re-bars; Concrete workers (wet); Luteman; Asphalt raker; Curb asphalt machine operator; Ready-mix scalemen, permanent, portable or temporary plant; Coring machine operator; Plasterers tenders; Underpinning and shoring of buildings; Fire watch; Signaling of all power equipment, to include trucks, excavating equipment, etc.; Tree topper ot trimmer; Batch dumpers; Kettle and tar men; Tank cleaners; Plastic installers; Scaffold workers; Motorized buggies or motorized unit used for wet concrete or handling of building materials; Sewer workers plus depth; Rod and chain men; Vibrator operators; Mortar mixer operator; Cement silica, clay, fly, ash, lime and plasters, handlers (bulk or bag); Cofferdam workers plus depth; on concrete paving, placing, cutting and tying of reinforcing; deck hand, dredge hand and shore laborers; Bankmen on floating plant; Asphalt workers with machine and layers; Grade checkers; Power tools; Cassion workered plus depth; Welders, cutters; burners and torch men; Chain saw operators; Paving breaker, jackhammer and drill operator; Layout man and/or tile layer; Steel form setters - street and highway; Air tamping hammerman; Signal man on crane; Concrete saw operator; Screen man on asphalt pavers; front end man on chip spreader; Wrecking laborers; Land scrapers; Scaffold workers; Handling, lighting and maintaining of all lights, flares and flashers; Cleaning of windows, doors, walls, floors, scrubbing and waxing of floors and covering and protection; Building construction shall be done by Laborers at the minimum rate that prevails in this agreement; Moving, signalling, hooking on and unhooking, flagging of all power machines; Driving stakes and setting of all stringlines for all electronic devices and all machinery.

GROUP 2: Dynamite Men; Asbestos Abatement Laborer; Hazardous Waste Worker

---

LABO1084-001 08/01/2014

BOND (Sorento) and MONTGOMERY COUNTIES

	Rates	Fringes
LABORERS		
Group 1	$ 25.45	23.70
Group 2	$ 25.95	23.70
Group 3	$ 26.95	23.70

LABORER CLASSIFICATIONS:

GROUP 1 - All classifications not listed below

GROUP 2 - Asbestos Abatement Worker and Hazardous Waste Worker; Lead Base Paint Worker

GROUP 3 - Dynamite Man

PAIN0030-002 07/01/2014

DEKALB COUNTY

	Rates	Fringes
PAINTER		
Brush, Drywall		
Taper/Finisher		
Sandblaster, and Spray	$ 41.73	19.85

PAIN0030-004 07/01/2014

BOONE, JO DAVIESS, LEE, OGLE, STEPHENSON, AND WINNEBAGO COUNTIES

	Rates	Fringes
PAINTER		
Brush, Roller, Spray,		
Sandblasting, Paperhanger,		
Taper, and Spray		
Structural Steel	$ 36.50	20.11

PAIN0030-010 07/01/2014

BUREAU, HANCOCK, LA SALLE, LIVINGSTON, MCDONOUGH, MCLEAN, PUTNAM, AND STARK COUNTIES

	Rates	Fringes
PAINTER		
Brush, Roller, Pressure		
Roller, Spray, Airless		
Spray, Sandblasting,		
Taper, Drywall		
Taper/Finisher, Structural		
Steel, and Bridges	$ 33.65	19.85

PAIN0032-005 05/01/2014

RANDOLPH COUNTY

	Rates	Fringes
PAINTER	$ 27.26	15.18

Epoxy or Toxic-Lead-Based Paint Work-$1.00 Premimum

PAIN0058-001 05/01/2014

BOND, CALHOUN, CLINTON, GREENE, JERSEY, MACOUPIN, MONROE, MONTGOMERY, PIKE, and WASHINGTON COUNTIES

	Rates	Fringes
PAINTER	$ 29.34	15.98

Epoxy or Toxic-Lead-Based Paint Work-$1.00 Premimum

PAIN0090-002 05/01/2014

ADAMS, BROWN, CASS, LOGAN, MENARD, MORGAN, and SCOTT COUNTIES

	Rates	Fringes
PAINTER	$ 29.58	15.68

Epoxy or Toxic-Lead-Based Paint Work-$1.00 Premimum

PAIN0157-001 07/01/2014

FULTON, MARSHALL, MASON, SCHUYLER, AND WOODFORD COUNTIES

	Rates	Fringes
PAINTER		
Brush, Spray, Pressure Roller, Sandblasting, Bridges, & New Structural Steel Work	$ 33.65	19.85

PAIN0157-008 05/01/2014

BUREAU, FULTON, HANCOCK, LEE, LASALLE, LIVINGSTON, MCDONOUGH, MARSHALL, PUTNAM, STARK, AND WOODARD COUNTIES

	Rates	Fringes
GLAZIER	$ 31.87	20.10

PAIN0502-002 05/01/2014

CARROLL, HENDERSON, HENRY, KNOX, MERCER, ROCK ISLAND, WARREN, and WHITESIDE COUNTIES

	Rates	Fringes
PAINTER		
Brush and Roller	$ 27.82	12.50
Spray, Structural Steel, & Sandblasting	$ 28.32	12.50

PAIN0513-003 11/01/2013

BOND, CALHOUN, CLINTON, GREENE, JERSEY, MACOUPIN (Southside), MONROE, RANDOLPH, AND WASHINGTON COUNTIES

	Rates	Fringes

GLAZIER.....$ 32.78 25.47

PAIN0581-001 06/01/2014

	Rates	Fringes
GLAZIER		
SECTOR ONE: HENRY, KNOX, MERCER, AND ROCK ISLAND COUNTIES	$ 27.96	14.31
SECTOR TWO: CARROLL, HENDERSON, JO DAVIESS, WARREN, AND WHITESIDE COUNTIES	$ 23.82	14.31

---

* PAIN0607-001 04/01/2015

BOONE, DE KALB, OGLE, STEPHENSON, and WINNEBAGO COUNTIES

	Rates	Fringes
GLAZIER	$ 37.48	20.75

PAIN1168-001 05/01/2014

ADAMS, BROWN, CASS, LOGAN, MACOUPIN (NORTHERN PART), MASON, MENARD, MONTGOMERY, MORGAN, PIKE, SCHUYLER, and SCOTT COUNTIES

	Rates	Fringes
GLAZIER	$ 32.38	15.88

PLAS0011-004 06/01/2012

CARROLL, JO DAVIESS, LEE, OGLE, STEPHENSON, AND WHITESIDE (Except Erie and area Southwest thereof) COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 32.52	22.18
PLASTERER	$ 32.54	17.85

PLAS0011-009 06/01/2012

DE KALB COUNTY

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 41.55	23.76

PLAS0011-015 06/01/2012

BOONE COUNTY

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 34.82	20.10

PLASTERER.....$ 33.36 18.95

PLAS0011-019 06/01/2012

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	$ 34.82	20.10
PLASTERER.....	$ 33.36	18.95

PLAS0018-002 07/01/2012

ADAMS, BROWN, CASS, HANCOCK, MCDONOUGH, MENARD, PIKE, and SCHUYLER COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	$ 25.20	19.20
PLASTERER.....	$ 28.50	19.12

PLAS0018-005 06/01/2014

HENDERSON (Northern Half), MERCER (Except Southeastern Part), AND ROCK ISLAND COUNTIES

	Rates	Fringes
PLASTERER.....	$ 28.11	15.10

PLAS0018-008 06/01/2000

HENDERSON COUNTY (Southern Half)

	Rates	Fringes
PLASTERER.....	$ 24.00	4.00

PLAS0018-011 05/01/2012

FULTON (Except Northwestern portion), MARSHALL (Western part except Toluca), MASON, and WOODFORD (Except Northwestern part & Minonk) COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	$ 27.09	22.19

PLAS0018-016 05/01/2012

FULTON (Except Northwestern portion), KNOX, MARSHALL (Western part except Toluca), MASON, WARREN, and WOODFORD (Except Northwestern part & Minonk) COUNTIES

	Rates	Fringes
PLASTERER.....	$ 27.77	21.50

PLAS0018-019 05/01/2012

MCLEAN COUNTY

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 30.59	17.48
PLASTERER	$ 29.50	20.63

PLAS0018-026 06/01/2012

BUREAU, HENRY (Eastern Half), LA SALLE, LIVINGSTON (Northern part including Pontiac) MARSHALL (Eastern part including Toluca), PUTNAM, STARK, and WOODFORD (Northwestern Part Including Minonk) COUNTIES

	Rates	Fringes
Cement Mason and plasterer	$ 35.00	19.87

PLAS0018-029 05/01/2012

FULTON (Northwestern Part) and MERCER (Southeastern Corner) COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 25.35	17.75

PLAS0018-030 05/01/2012

FULTON (Northwestern Part) and MERCER (Southeastern Corner) COUNTIES

	Rates	Fringes
PLASTERER	$ 27.77	21.50

PLAS0018-031 05/01/2012

KNOX AND WARREN COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 25.35	17.75

PLAS0018-035 05/01/2014

HENDERSON (Northern Half), HENRY (Western Half), MERCER (Except Southeastern part), ROCK ISLAND, and WHITESIDE (Erie & area Southwest thereof) COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 25.67	17.47

PLAS0090-002 08/01/2014

BOND, CALHOUN, CLINTON, GREENE, JERSEY, MACOUPIN, MONROE, and MONTGOMERY (Excluding the towns of Coalton, Coffen, Fillmore, Nokomis, Ohlman, Wenoah, Witt) COUNTIES

	Rates	Fringes
CEMENT MASON	$ 32.00	22.70
PLASTERER	$ 31.00	18.95

PLAS0143-005 05/01/2014

LIVINGSTON COUNTY (Southern part except Pontiac)

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 27.18	12.70
PLASTERER	$ 25.39	13.80

PLAS0143-016 04/01/2014

RANDOLPH and WASHINGTON COUNTIES

	Rates	Fringes
Cement Masons & Plasterers	$ 29.05	14.10

PLUM0023-001 06/01/2014

BOONE, CARROLL (East of Rt 78 including Mt Carroll), JO DAVIESS, OGLE, STEPHENSON, and WINNEBAGO COUNTIES

	Rates	Fringes
PLUMBER/PIPEFITTER	$ 43.10	20.61

PLUM0025-001 05/01/2014

ADAMS, BROWN, HANCOCK (Western Half), CARROLL (West of Rt 78 excluding Mt carroll), HENDERSON, HENRY, KNOX, LEE, MERCER, ROCK ISLAND, SCHUYLER (Except Browning, Frederick, and Hickory TWPS), WARREN, and WHITESIDE COUNTIES

	Rates	Fringes
PLUMBER/PIPEFITTER	$ 36.90	20.29

PLUM0063-002 05/01/2014

FULTON, HANCOCK (Eastern Half), MCDONOUGH (Except Prairie), MARSHALL (South of Rt 17), MASON (North of Rt 136), SCHUYLER (Browning, Frederick & Hickory TWPS), STARK, and WOODFORD (North of Rt 116 TO Rt 116A, and Area West of Rt 116A to, but excluding Goodfield) COUNTIES

	Rates	Fringes
PLUMBER	$ 34.52	21.41

PLUM0099-001 11/01/2014

LIVINGSTON (Pontiac and South of Rt 116 extending East to Ford County), MCLEAN, AND WOODFORD (South of Rt 16 to Rt 116A area East of Rt 116A to and including Goodfield) COUNTIES

	Rates	Fringes
Plumber, Pipefitter, Steamfitter	$ 40.35	19.80

PLUM0101-001 07/01/2014

CLINTON (Western 2/3 including Albers, Aviston, Bartels, Beckemeyer, Breese, Carlyle, Germantown, New Baden, New Memphis, Posey & Trenton), MCDONOUGH (Prairie), MONROE (Hecker), RANDOLPH (Baldwin, Red Bud, Ruma, Tilden), and WASHINGTON (Addieville, Covington, Cardes, Caspars, Damiansville, Darmstrat, Elkhorn, Johannisburg, Lively Grove, Nashville, New Menden, Oakdale, Okawville, Plum, Rentcher, Stone Church Hill & Venedy) COUNTIES

	Rates	Fringes
PLUMBER/PIPEFITTER	$ 37.00	14.92

PLUM0130-005 06/01/2014

BUREAU, LA SALLE, LIVINGSTON (North of Rt. 116 excluding the City of Pontiac), MARSHALL (North of Rt 17 and east of Rt. 116a), and PUTNAM COUNTIES

	Rates	Fringes
PLUMBER	$ 46.65	25.52

PLUM0137-003 04/01/2014

CASS, LOGAN, MACOUPIN (north of State Route 108 including the Town of Carlinville), MASON (south of State route 136 including the Town of Havana), MENARD, MONTGOMERY (north and east of State Route 127 including the Towns of Hillsboro and Schram City), MORGAN, PIKE, & SCOTT

	Rates	Fringes
Plumber and Steamfitter	$ 40.96	16.00

* PLUM0160-002 01/01/2015

RANDOLPH COUNTY (Southeastern side)

	Rates	Fringes
PLUMBER/PIPEFITTER	$ 43.36	16.44

PLUM0353-002 05/01/2014

FULTON, HANCOCK (Eastern Half), MCDONOUGH (Except Prairie), MARSHALL (South of Rt 17), MASON (North of Rt 136), SCHUYLER (Browning, Frederick & Hickory TWPS), STARK, and WOODFORD (North of Rt 116 TO Rt 116A, and Area West of Rt 116A to, but excluding Goodfield) COUNTIES

	Rates	Fringes
PIPEFITTER	$ 37.40	19.69

PLUM0360-001 07/01/2014

CLINTON (Northwestern part including St Rose, Frogtown, Jamestown & Keyport), RANDOLPH (Western 1/4 including Kellog, Modoc, Prairie, Durocker, and Roots), and MONROE (Except Hecker) COUNTIES

	Rates	Fringes
PLUMBER	$ 37.75	14.15

PLUM0439-002 01/01/2014

CLINTON (Northwestern part including St. Rose, Frogtown, Jamestown and Key Port), RANDOLPH (Western 1/4 including Kellog, Modoc, Prairie, Durocker, and Roots) AND MONROE (Except Hecker) COUNTIES

	Rates	Fringes
Steamfitter	$ 38.00	16.04

PLUM0501-002 12/01/2013

DE KALB

	Rates	Fringes
PLUMBER/PIPEFITTER	$ 41.20	29.15

PLUM0553-001 01/01/2014

BOND, CALHOUN, GREENE, JERSEY, MACOUPIN (South of Rt 108), AND MONTGOMERY (Southwest of Rt 127) COUNTIES

	Rates	Fringes
PLUMBER/PIPEFITTER	$ 38.46	13.50

FOOTNOTE:

A. 4 hours paid holiday for Christmas Eve if Holiday falls on Monday through Friday.

PLUM0597-007 06/01/2014

BUREAU, LA SALLE, LIVINGSTON (North of Rt. 116 excluding the City of Pontiac), MARSHALL (North of Rt 17 and east of Rt. 116a), and PUTNAM COUNTIES

	Rates	Fringes
PIPEFITTER	$ 46.00	26.84

PLUM0653-002 09/01/2014

CLINTON (Eastern 1/3) and WASHINGTON (Eastern 1/2) COUNTIES

	Rates	Fringes
Plumber and Steamfitter	$ 36.10	14.58

ROOF0002-005 03/01/2014

BOND, CALHOUN, CLINTON, GREENE, JERSEY, MACOUPIN (Southern Half), MONROE, PIKE (Remainder), RANDOLPH, AND WASHINGTON COUNTIES

	Rates	Fringes
ROOFER	$ 30.10	16.14

ROOF0011-005 12/01/2014

JO DAVIESS, LEE, LIVINGSTON (East of Route 47), OLGE, STEPHENSON, WHITESIDE (Sterling and Rock Falls), and WINNEBAGO COUNTIES

	Rates	Fringes
ROOFER	$ 40.10	19.43

ROOF0011-008 12/01/2014

BUREAU, LA SALLE, MARSHALL, and PUTNAM COUNTIES

	Rates	Fringes
ROOFER	$ 30.91	19.42

ROOF0032-002 07/01/2014

HENDERSON, HENRY, KNOX, MCDONOUGH (Western Half including Macomb), MERCER, ROCK ISLAND, WARREN, and WHITESIDE COUNTIES

	Rates	Fringes
ROOFER	$ 26.14	15.70

ROOF0069-002 06/15/2013

FULTON, LIVINGSTON (all towns to Rt. 47), MARSHALL (Camp Grove, Hallock Held, Henry Lacon, LaRose, LaPrairie, Pattonsburg, Sparland, Toluca, Washburn and Wilburn), McDONOUGH (Adair, Bushnell, Industry, Prairie City, Bardolph, Good Hope, New Philadelphia and Walnut Grove), McLEAN, STARK, and WOODFORD COUNTIES

	Rates	Fringes
ROOFER	$ 29.58	15.96

ROOF0069-004 06/15/2013

BROWN, PIKE (Northern Half), AND SCHUYLER COUNTIES

	Rates	Fringes
ROOFER	$ 29.58	15.96

ROOF0069-005 06/15/2013

ADAMS AND HANCOCK COUNTIES

	Rates	Fringes
ROOFER	$ 29.58	15.96

ROOF0112-001 06/01/2014

CASS, LOGAN, MACOUPIN (Northern Half), MASON, MENARD, MONTGOMERY, MORGAN, AND SCOTT COUNTIES

	Rates	Fringes
ROOFER	$ 27.31	16.60

SHEE0001-001 06/01/2010

BUREAU, LA SALLE, MARSHALL, PUTNAM, and STARK COUNTIES

	Rates	Fringes
SHEET METAL WORKER	$ 35.14	19.19

SHEE0001-003 05/01/2011

FULTON, MCLEAN, PEORIA, TAZWELL, AND WOODFORD COUNTIES

	Rates	Fringes
SHEET METAL WORKER	$ 31.92	21.65

SHEE0091-002 06/01/2014

	Rates	Fringes
SHEET METAL WORKER		
Henry, Knox, McDonough, Mercer, Rock Island, Warren & Whiteside (West of Illinois Route 78 & South of U.S. Route 30) Counties	$ 30.54	20.80
West of Illinois Route 78 & North of U.S. Route 30 in Jo Daviess, Carrol, and Whiteside Counties	$ 27.81	16.94

SHEE0091-003 06/01/2009

ADAMS, CALHOUN, HANCOCK, HENDERSON, and PIKE COUNTIES

	Rates	Fringes
SHEET METAL WORKER	$ 24.75	16.52

SHEE0218-001 06/01/2011

BROWN, CASS, LOGAN, MASON, MENARD, MORGAN, SCHUYLER, and SCOTT COUNTIES

	Rates	Fringes
SHEET METAL WORKER	$ 30.85	22.49

SHEE0219-001 06/01/2011

BOONE, CARROLL (Eastern Half), DEKALB, JO DAVIESS (East of Hwy 78) LEE, OGLE, STEPHENSON, WHITESIDE, and WINNEBAGO COUNTIES

	Rates	Fringes
SHEET METAL WORKER	$ 36.18	20.83

SHEE0265-005 06/01/2011

LIVINGSTON COUNTY

	Rates	Fringes
SHEET METAL WORKER	$ 41.66	23.95

SHEE0268-001 07/01/2010

BOND, CLINTON, GREENE, JERSEY, MACOUPIN, MONROE, MONTGOMERY, RANDOLPH, and WASHINGTON COUNTIES

	Rates	Fringes

Sheet Metal Worker.....$ 33.28 14.80

TEAM0065-002 05/01/2013

BUREAU, CARROLL (West of Route78/South of Route 72), FULTON, HANCOCK, HENDERSON, JO DAVIESS (West of Route 78), KNOX, LASALLE, LEE (West of Route 251), LIVINGSTON (Amity, Long Point, Nevada, Newtown Reading, & Sunbury), MARSHALL, MASON, MCDONOUGH, MCLEAN (South of a straight line from where Route 24 intersects the Woodford County line in a Southeast direction to the South Southwest corner of Livingston County), PUTNAM, STARK, WARREN, WHITESIDE, and WOODFORD (All except Northeast Corner East of Route 51/251 and South of Route 24) COUNTIES

	Rates	Fringes
TRUCK DRIVER		
Group 1	$ 32.04	10.70
Group 2	$ 32.50	10.70
Group 3	$ 32.72	10.70
Group 4	$ 33.02	10.70
Group 5	$ 33.88	10.70

FOOTNOTE: a. $201.20 per week

CLASSIFICATIONS:

GROUP 1: Drivers on 2 axles hauling less than 9 tons; air compressor & welding machines and brooms, including those pulled by separate units; Truck Driver Helper, warehouse employees; Mechanic Helpers; greasers and tiremen; pick-up trucks when hauling material, tools, or workers to and from and on the job site; and forklifts up to 6,000 lb capacity.

GROUP 2: 2 or 3 axles hualing more than 9 tons but hauling less than 16 tons; A-frame winch trucks; hydrolift trucks; Vactor Trucks or similar equipment when used for transportation purposes; Forklift over 6,000 lb.capacity; winch trucks; and four axle combiation units.

GROUP 3: 2, 3 or 4 Axles hauling 16 tons or more; 5-Axles or more combination units; drivers on water pulls; articulated dump trucks; mechanics and working forepersons.

GROUP 4: Low Boy and Oil Distributors.

GROUP 5: Drivers who require special protective clothing while employed on hazardous waste work.

TEAM0065-008 05/01/2013

ADAMS, BOND, BROWN, CALHOUN, CASS, CLINTON, GREENE, HENRY, JERSEY, LOGAN, MACOUPIN, MENARD, MERCER, MONROE, MONTGOMERY, MORGAN, PIKE, RANDOLPH, ROCK ISLAND, SCHUYLER, SCOTT, and WASHINGTON COUNTIES

	Rates	Fringes

TRUCK DRIVER

Group 1	$ 30.87	17
Group 2	$ 31.34	17
Group 3	$ 31.56	17
Group 4	$ 31.86	17
Group 5	$ 32.71	17

CLASSIFICATIONS:

GROUP 1: Drivers on 2 axles hauling less than 9 tons; air compressor & welding machines and brooms, including those pulled by separate units; Truck Driver Helper, warehouse employees; Mechanic Helpers; greasers and tiremen; pick-up trucks when hauling material, tools, or workers to and from and on the job site; and forklifts up to 6,000 lb capacity.

GROUP 2: 2 or 3 axles hualing more than 9 tons but hauling less than 16 tons; A-frame winch trucks; hydrolift trucks; Vactor Trucks or similar equipment when used for transportation purposes; Forklift over 6,000 lb.capacity; winch trucks; and four axle combiation units.

GROUP 3: 2, 3 or 4 Axles hauling 16 tons or more; 5-Axles or more combination units; drivers on water pulls; articulated dump trucks; mechanics and working forepersons.

GROUP 4: Low Boy and Oil Distributors.

GROUP 5: Drivers who require special protective clothing while employed on hazardous waste work.

---

* TEAM0179-011 06/01/2011

LIVINGSTON (Avoca, Belle Prairie, Broughton, Charlotte, Chatsworth, Dwight, Eppards Point, Esmen, Fayette, Forrest, Germanville, Indian Grove, Nebraska, Odell, Owega, Pike, Pleasant Ridge, Pontiac, Rooks Creek, Round Grove, Saunemin, Sullivan, Union, & Waldo), MCLEAN (North of a straight line starting at the intersection of McLean-Woodford Counties line & Route 24 in a Southeastern direction to the South Southwest corner of Livingston County), and WOODFORD (Northeast corner east of Route 51/251 & North of Route 24) COUNTIES

	Rates	Fringes
TRUCK DRIVER		
2 or 3 Axle Trucks	$ 35.65	7.25+a
4 Axle Trucks	$ 35.80	7.25+a
5 Axle Trucks	$ 36.00	7.25+a
6 Axle Trucks	$ 36.20	7.25+a
All Lowboy Trucks	$ 37.20	7.25+a

FOOTNOTE: a. $229.80 per week.

FOOTNOTE: An additional $.20 per axle shall be paid for all vehicles with more than six (6) axles.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Articulated Dumps; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry Alls; Forl Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Pothole Repair Trucks; Power Mower Tractors; Quick Change Barrier; Self-Propelled Chip Spreader; Shipping and Receiving Clerks and Checkers; Skipman; Slurry Trucks, two-man operation; Slurry Trucks, Conveyor Operated - 2 or 3 man operation; Teamsters; Unskilled Dumpmen; Warehousemen and Dockmen; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dispatcher; Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long;
Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more; Mechanic - *Truck Welder and *Truck Painter*These classifications shall only apply in areas where and when it has been a past area practice; Asphalt Plant Operators in areas where it has been past practice

Group 4 - Dual-purpose vehicels, such as mounted crane tucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

---

* TEAM0325-001 06/01/2011

BOONE, CARROLL (East of Route 78/North of Route 72), JODAVIESS (East of Route 78), STEPHENSON, and WINNEBAGO COUNTIES

	Rates	Fringes
TRUCK DRIVER		
2-3 Axles	$ 32.96	15.62
4 Axles	$ 33.11	15.62
5 Axles	$ 33.31	15.62
6 Axles	$ 33.42	15.62

FOOTNOTE: An additional $.20 per axle shall be paid for all

vehicles with more than six (6) axles.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Forl Lifts and Hoisters; Helpers;
Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers
Pole Trailer, up to 40 feet; Power Mower Tractors; Skipman; Slurry Trucks, two-man operation; Teamsters; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation
Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long, additional $0.50 per hour; Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more
*Mechanic*Truck Welder and Truck Painter; *Winter Rate: Between Dec. 15 and Feb. 28 the mechanic and welder rate shall be $2.00 less than the scheduled scale. Truck Painter and Truck Welder classifications shall only apply in areas where and when it has been a past area practice;
Dual-purpose vehicels, such as mounted crane tucks with hoist and accessories

Group 4 - Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

---

* TEAM0330-001 06/01/2010

DEKALB, LEE (East of Route 251, Compton, Lee, Paw Paw, Scarboro, & Steward), and OGLE (North of Route 72/East of Route 251, Adeline, Byron, Creston, Dement, Forreston North of Route 72, Leaf River North of Route 72, Lynnville, Monroe, Rochelle, & Scott) COUNTIES

	Rates	Fringes
TRUCK DRIVER		
2-3 AXLES	$ 33.95	.15+a
4 AXLES	$ 34.10	.15+a

5 AXLES	$ 34.30	.15+a
6 AXLES	$ 34.50	.15+a

FOOTNOTE: a. $514.00 per week

An additional $.20 per axle shall be paid for all vehicles with more than six (6) axles.

Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

900 straight time hours or more in 1 calendar year for the same employer shall receive 1 week paid vacation; 3 years - 2 weeks paid vacation; 10 years - 3 weeks paid vacation; 20 years - 4 weeks paid vacation.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Articulated Dumps; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry Alls; Forl Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Pothole Repair Trucks; Power Mower Tractors; Quick Change Barrier; Self-Propelled Chip Spreader; Shipping and Receiving Clerks and Checkers; Skipman; Slurry Trucks, two-man operation; Slurry Trucks, Conveyor Operated - 2 or 3 man operation; Teamsters; Unskilled Dumpmen; Warehousemen and Dockmen; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dispatcher; Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long;
Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more; Mechanic - *Truck Welder and *Truck Painter*These classifications shall only apply in areas where and when it has been a past area practice; Asphalt Plant Operators in areas where it has been past practice

Group 4 - Dual-purpose vehicels, such as mounted crane tucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

---

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)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the

wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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.

==========

END OF GENERAL DECISION

DIVISION 1 – GENERAL REQUIREMENTS

SECTION 01110 - SUMMARY OF WORK

1.00 GENERAL

This project consists of all labor, materials, tools and plant required to complete all work related to the rehabilitation and upgrade of the Pittsfield, Illinois, Waste Water Treatment Plant. Work includes, but is not limited to, new access road, new headworks, installation of automatic bar screen and grit removal structure, wet well pump station, motor control center, flow measurement, clarifier drive replacements, blower and air header replacement/rehabilitation, non-potable water connection and backflow structure, tertiary filter drain line, SCADA, existing building rehabilitations, site restoration, fencing, and demolition of old headworks once the new system becomes operational. Included in the project shall be all related items necessary to complete work described in the specification or shown in the plans.

A. All parts of the project are located in the City of Pittsfield, Illinois.

B. This project is located in Sections 13, Township 5 South, Range 4 West of the Fourth Principal Meridian west of U.S. Highway 54.

1.01 SCOPE OF WORK

A. This contract includes but is not limited to the following items of work, which are listed for the convenience of the Contractor to assist in understanding the intended scope of work. A list of bid items can be found in section 00410 Proposal.

1. Access Roads and Parking Areas: including grading, chip seal, aggregate base, and gravel as specified.

2. Sitework: including clearing, grubbing, excavation (including rock excavation), backfilling, erosion control, grading, aggregate base, embankment protection, flowable fill, seeding, concrete pavement and walks, and fencing with gates.

3. Headworks Construction: including cast-in-place concrete, automatic bar screen and manual bypass bar screen, aerated grit removal pit and dewatering screw, hand gates, influent lift station including new pumps and accessories, flow measurement and accessories, and all piping necessary to make the headworks functional.

4. Piping: Including yard piping, process piping, gravity sewer piping including manholes, force mains, non-potable water supply piping with tie-ins and backflow prevention, yard hydrants, pneumatic piping and gas piping.

5. Clarifier Drive Replacement and Bridge Repainting: There are (2) primary clarifier drives and (2) secondary clarifier drives that are shown as one bid item: Item 7, section 00410. Also included in Bid Item 7 will be the repainting of the bridges for both primary clarifiers and both secondary clarifiers. A smaller chlorination basin drive will also be replaced and is shown as a separate bid item: Item 8, section 00410. Also included in Bid Item 8 will be the repainting of the bridge for the chlorination basin. This scope of work includes removal of old drives and installation of new drives and repainting of the bridges in accordance with section 09900 Paints and Coatings.

6. Air Header Rehab / Main Air header Replacements: Includes removal of existing air pipe, installation of new pipe as specified in plans, restoration of disturbed ground. Includes all building modifications, excavation, piping, fittings, concrete piers, supports, bedding, backfill, landscaping, gravel, landscape fabric, and any other incidental items necessary to make the aeration system functional.

7. Electrical/SCADA/MCC/Controls: Includes all electrical connections needed for proper equipment functionality and communication with SCADA system. A new SCADA system and Motor Control Center (MCC) shall be installed. Work for the Motor Control Center shall include potential building modifications needed to accommodate the equipment such as walls, supports, concrete pads, etc.

Additional electrical work could include exterior electrical work, lighting fixtures, conduit, boxes, panels, wiring devices, transient voltage suppression, service and distribution, controls and control panels, and grounding.

8. Tertiary Filter: Including bid item numbers 12 and 13 in section 00410. A drain line is to be added to the existing tertiary filter system. In addition, a non-potable water supply connection will be made after the filter to provide service water to the facility. This work includes all items necessary to connect the existing non-potable water distribution system two (2) new non-potable water pumps and pressure tank from the filtered effluent water supply to an existing service water pipe network.

9. Building Renovation and Remodeling: New Doors, Windows, Fascia, Soffit, and Brick Tuck-Pointing for all existing buildings.

10. Demolition of Headworks: Including demolition, removal of debris, site leveling, fertilizing, seeding and mulching.

11. Clean up.

12. Seeding, fertilizing and mulching.

13. Rock excavation. If rock is encountered it shall be considered incidental.

14. Dewatering. If groundwater is encountered, dewatering shall be considered incidental.

15. All items necessary for total completion.

1.02 OWNER

A. The Owner, as referred to in these Contract Documents, is the City of Pittsfield, 215 North Monroe, Pittsfield, Illinois, 62363.

1.03 ENGINEER

A. The Engineer, as referred to in these Contract Documents, is MECO Engineering Company, Inc. Acting personally or through his authorized representative for such act by the Owner.

1.04 SHOP DRAWING SUBMITTAL

A. The Contractor agrees that shop drawing submittals processed by the Engineer are not Change Orders; that the purpose of shop drawing submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use. The Contractor shall analyze the shop drawings and samples before submitting them to the Engineer and shall certify that they meet the intent of the drawings and specifications.

B. Shop drawings submitted to the Engineer for review shall be assembly and installation drawings, including electrical, structural, and control details, together with detailed specifications and data covering materials used, parts, devices, and accessories forming a part of the equipment furnished.

C. Each shop drawing submitted must be clearly and uniformly identified and include the following:

1. Drawing number.
2. Revision number and date (first submittals to have revision number of zero).
3. Descriptive drawing title.
4. Manufacturer.
5. Supplier.
6. Contractor.
7. Owner, city and state.
8. Project name.
9. Contract number and name.

D. Upon receipt of submitted shop drawings or samples, the Engineer will review the drawings and mark "No Exceptions Taken, Make Corrections Noted, Amend and Resubmit, Rejected - See Remarks".

E. If the drawings are marked "Make Corrections Noted, Amend and Resubmit, Rejected - See Remarks", the Contractor must take appropriate corrective action and then submit corrected, new, or replacement drawings to the Engineer. If subsequent resubmittals are necessary, the Contractor shall be billed by and pay directly to the Owner the cost of the Engineer's time to review such corrected, new, or replacement drawings at the following rates:

1.	Senior Principal Engineer	$158.00 per hour
2.	Principal Engineer:	$138.00 per hour
3.	Engineer Manager:	$130.00 per hour
4.	Senior Engineer III:	$128.00 per hour
5.	Senior Engineer II:	$124.00 per hour
6.	Senior Engineer I:	$120.00 per hour
7.	Engineer:	$110.00 per hour
8.	Clerical:	$ 48.00 per hour

F. Minimum charges shall be one hour for each category involved for each time review required.

G. Payment shall be made each month or as billed and is due and payable upon receipt of invoice. The Contractor's request for final payment will not be approved or paid until such charges are paid in full.

H. Contractor further agrees that if deviations, discrepancies or conflicts between shop drawing submittals and the contract documents in the form of design drawings and specifications are discovered either prior to or after shop drawing submittals are processed by the Engineer, the design drawings and specifications shall control and shall be followed.

1.05 CONTROL AND REGULATION OF WORK

A. The Engineer is the representative of the Owner and shall have the authority to exercise his judgment and initiative during the construction phase. He may, without written order or other formality, correct obvious errors in the drawings and specifications or make other adjustments required to adapt the work to existing conditions or circumstances, provided such corrections and revisions are consistent with the intent of the drawings and specifications, do not materially affect the total contract price and vary the proportion and quantity of only those items of work for which unit prices are contained in the Contract.

1.06 GENERAL CONDITIONS OF CONSTRUCTION

A. The Contractor shall, at all times, carry on the work in such a manner as to minimize the interference of traffic, utility, and municipal services and adjoining property.

B. The work shall be carried out in such a manner that all physical structures and natural features are restored to at least as good a condition as they were in before the work was done. It is understood that where specifications apply, their provisions shall determine the character and manner of restoration of existing structures and features.

C. Any damage done to private or public property shall be repaired by the Contractor to the satisfaction of the Owner of said property, and the cost thereof shall be included in the price bid by the Contractor for other items.

D. Valve and service boxes, valve vaults, gas drips, and other appurtenances on utility lines shall be kept free of excavated material and shall be left accessible and operable at all times.

E. Construction in Easements: While in easement across private property, the Contractor shall confine all operations in the easement area and shall be responsible and liable for all damages outside of the easement area. Trees, fences, shrubbery or other type of surface improvements located in easements will require protection during construction. The provisions of this specification shall apply to all easement areas as well as the public right-of-way. Precautions shall be taken by adequate sheeting or other approved method to prevent any cave in or subsidence beyond the easement limits or damage to improvements within the easement. In

general, the easement area is intended to provide reasonable access and working area for efficient operation by the Contractor. Where easement space for efficient operation is not provided, the Contractor shall be responsible for organizing his operations to perform within the restrictions as shown on the drawings.

F. The Contractor shall coordinate with the utility company and pay all cost associated with the temporary support or relocation of utility poles.

G. All trees required to be removed to complete the construction of the project shall be removed by the Contractor at his expense.

H. All sidewalks required to be removed to complete the construction of the project shall be replaced by the Contractor and paid for per Bid Item.

1.07 PERMITS, CERTIFICATES, LAWS, AND ORDINANCES

A. The Contractor shall, at his own expense, procure all permits, certificates and licenses required of him by law for the execution of this work. Contractor shall comply with all Federal, State and local laws, ordinances, or rules and regulations relating to the performance of the work.

1.08 CONSTRUCTION SCHEDULING AND PRE-CONSTRUCTION CONFERENCE

A. The successful Contractor shall attend a pre-construction meeting with the Engineer prior to any construction. The Engineer will schedule the meeting promptly following the contract awards. At this meeting, the Contractor shall present a work schedule, work sequence, detailed cost breakdown and list of subcontractors.

B. The work schedule shall include all anticipated start and completion dates for items of work in this Contract.

C. The Contractor shall submit updated schedules to the Engineer when there are revisions to the schedule.

D. The project has been designed to be completed in two (2) phases. It is intended that the new 3-cell lagoon system (Phase 1) be completed and placed into operation prior to removing the existing 3-cell lagoon from service. At no time shall sewage treatment cease to meet the discharge permit effluent limitations.

1.09 LOCAL UTILITIES

A. Underground facilities, structures, and utilities have been plotted from available surveys and records and, therefore, their locations must be considered approximately. There may be others, the existence of which is presently unknown. Verification of the locations of underground utilities, shown or not shown, will be the responsibility of the construction contractor.

B. The Contractor shall avoid interference or damage to any utilities. If the Contractor causes damage to utilities due to carelessness or neglect, the repairs shall be made by the owner of the utility involved, and all charges made for necessary repairs and replacements shall be borne by the Contractor.

C. Utilities may be located by calling 1-800-892-0123. Utilities that are not a part of the Illinois One-Call System must be contacted individually.

D. The Contractor shall notify all owners of subsurface facilities of his planned operations and have owners locate all facilities prior to construction. Any delays due to conflicts with such facilities shall not be cause for extra payment.

E. The Contractor shall satisfactorily shore, support and protect any and all structures and all pipes, sewers, drains, conduits, and other facilities, and be responsible for any damage resulting thereto. The Contractor shall not be entitled to any damages or extra pay on account of any postponements, interference or delay caused by any such structures and facilities being on the line of the work, whether they are shown on the drawings or not.

F. The Contractor shall take all reasonable precautions against damage to existing utilities. However, in the event of a break in an existing water main, gas main, sewer or underground cable, he shall immediately notify a responsible official from the organization operating the utility interrupted. The Contractor shall lend all possible assistance in restoring service and shall assume all costs, charges, or claims connected with the interruption

and repair of such services.

1.10 LOCAL CONDITIONS

A. The Contractor shall satisfy himself regarding all local conditions affecting the work by personal investigation. Information derived from maps, plans, specifications, available through the Owner, Engineer or other agencies, shall not relieve the Contractor from his responsibility hereunder, or from fulfilling any and all of the terms and requirements of this contract.

1.11 SUBSURFACE INVESTIGATION

A. Soil borings were completed for the purpose of evaluating onsite soil permeability. A copy of the geotechnical report is included in the blue sheets at the end of this booklet.

B. There is no express of implied guarantee as to the accuracy of completeness of the subsurface information, or to the interpretation thereof by the Owner, the Engineer, or any of their representatives. The subsurface information or copies thereof do not form a part of this or any other Contract Document issued by the Owner for this project.

C. Each prospective bidder shall make his own interpretation of subsurface information issued to him, and shall, at his own expense, make any surveys and investigations as he may deem necessary to evaluate conditions which will affect performance of the work and the required permeability standards specified.

1.12 PROTECTION OF THE SITE

A. Except as otherwise provided herein or on the plans, the Contractor shall protect all existing structures, fences, sheds, garages, walks, pipelines, trees, shrubs, lawns, etc., during the progress of this work. The Contractor shall be responsible for removing from the site all excess excavation, debris and unused materials and shall, upon completion of the work, restore the site as nearly as possible to its original condition. This restoration would include the replacement of any facilities or landscaping which has been damaged, and will be done at the Contractor's expense.

1.13 RESPONSIBILITY OF CONTRACTOR FOR BACKFILL SETTLEMENT

A. The Contractor shall be responsible, financially and otherwise, for:

1. Any and all settlement and erosion of trench and other backfill which may occur from the time of original backfilling until the expiration of a period of one year from and after the date of final acceptance of the entire Contract under which the backfilling work was performed.

2. The refilling and repair of all backfill settlement and erosion and the repair or replacement to the original or better condition of all pavement, top surfacing, driveways, curbs, gutters, walks, surface structures, utilities, and drainage facilities, sod and shrubbery, which have been removed or destroyed in connection with backfill placement operations.

3. Any and all damage claims filed with or court actions brought against the Owner for and on account of any damage or damages directly or indirectly caused by said backfill settlement or erosion.

B. The Contractor shall make, or cause to be made, all necessary backfill placement, and repairs or replacement of appurtenances thereto, immediately from and after due notifications by the Engineer or Owner of backfill settlement and erosion and resulting damage at any designated location or locations. If the Contractor does not make the necessary repairs and the Owner deems it necessary, the Owner may make the necessary repairs at the Contractor's expense.

1.14 CONSTRUCTION LIMITS

A. Any areas needed for construction which have not been secured by the Owner shall be acquired by the Contractor at his sole expense, and any extra costs shall not be a basis for extra payment, as such additional areas shall be considered as a matter of convenience.

1.15 PROTECTION AND STORAGE OF EQUIPMENT AND MATERIALS

A. The Contractor shall exercise care in the protection of materials and equipment furnished and/or installed under this Contract while they are in storage at the site, and during and after installation prior to final acceptance. Except as specifically noted to the contrary hereinafter, the Contractor shall be responsible for providing for any on or off-site warehousing or storage, which may be necessary to adequately protect such materials and equipment.

B. Store, handle and ship pipe, fittings and equipment so as to prevent permanent deformation or damage.

C. Exercise care and protect all equipment and materials during storage, shipment, and prior to delivery and acceptance. Keep openings in pipe, vessels, equipment and machinery closed with adequate durable covers after final shop inspection.

D. Adequately crate, block, anchor and protect material for shipment. Replace items damaged without expense to Owner.

1.16 INTERFERENCE WITH TRAFFIC

A. The work shall be carried out at all times in a manner causing a minimum of interference with traffic. The Contractor shall provide necessary warning signs, lights and flagmen, where required, to expedite the movement of traffic. He shall cooperate at all times with the traffic authorities.

B. In no case shall traffic be completely blocked in a street or roadway without the express consent of the Owner.

1.17 CONTRACTOR UTILITIES

A. The Contractor shall make all arrangements and pay all costs for necessary quantities of water for purposes of filling, flushing, and placing the system into service for the Owner's use. The Contractor must furnish any hoses, connections, temporary meters, etc., to convey the water to the new piping.

B. Power and other necessary utilities will be available on site. The Contractor must furnish any temporary wiring, connections, temporary meters, temporary step-down transformers etc., to convey adequate power to the locations where it is needed.

C. During certain stages of the project, power from the public utility may not be available in the locations where it is needed. In addition, power may not be available in the necessary phases, voltages or amperages required. When these scenarios occur, it shall be the responsibility of the Contractor to provide temporary power at his expense. In some cases temporary power may be available from the City of Fayette's power lines. Other times, it may be necessary to use a generator to supply the necessary power. Power requirements shall be coordinated with the Owner at all times.

D. At no time shall the treatment facility be prevented from normal operation due to insufficient power supply.

1.18 EXPLOSIVES

A. The Contractor shall comply with all laws, ordinances, applicable safety code requirements, and regulations relative to the handling, storage and use of explosives and the protection of like and property. He shall be responsible for all damage caused by his blasting operations.

1.19 SAFETY

A. To protect persons from injury and to avoid property damage, adequate barricades, construction signs, torches, red lanterns and guards as required shall be placed and maintained by the Contractor at his expense during the progress of the construction work and until it is safe for traffic to use the roads and streets. All material piles, equipment and pipe which may serve as obstructions to traffic shall be enclosed by fences or barricades and shall be protected by proper lights when the visibility is poor. The rules and regulations of the local authorities respecting safety provisions shall be observed.

B. Temporary support, adequate protection and maintenance of all underground and surface structures, drains, sewers, and other obstructions encountered in the progress of the work shall be furnished by the Contractor at

his expense. The structures which may have been disturbed shall be restored upon completion of the work.

C. Property and surface structures shall be protected during construction operations unless their removal for purposes of construction is authorized by the Engineer. Manmade surface improvements which are moved or disturbed by the Contractor shall be restored to the original condition, after construction is completed, at the Contractor's expense.

D. Any trees or shrubbery which are located within the City property may be removed by the Contractor if they interfere with normal construction requirements. Care should be taken to leave in place as many trees as possible. Responsibility for any damage or claims for damage caused by construction operations outside of the City property shall be assumed by the Contractor. Settlement of any damage or claims for damage shall be made by the Contractor as soon as possible and in a manner satisfactory to the Engineer. Any grass area disturbed by the construction shall be seeded in accordance with the governing specification, Section 02374.

1.20 CONTROL WORK

A. Basic horizontal and vertical control points will be designated by the Engineer. These points shall be used as datum for the Work. All additional survey, layout, and measurement work shall be performed by Contractor as a part of the Work.

B. From the control points and bench marks designated by the Engineer, the Contractor shall complete the layout of the work and shall be responsible for all measurements that may be required for execution of the work to the location and limits required.

C. Contractor shall submit to Owner's Project Representative one copy of all construction survey notes and data.

D. To the extent practicable, Contractor shall maintain all cut stakes in excavation areas until the adjacent excavation has reached final grade or subgrade.

E. When so requested by the Owner's Project Representative, the Contractor shall furnish one laborer to assist the Owner's Project Representative in spot-checking of the construction layout and grades.

1.21 LINES AND GRADES

A. All staking required for the project shall be by the Contractor. The Contractor shall be required to construct all facilities to the lines and grades as shown on the plans.

B. When a pipeline is shown on the plans or otherwise necessary to construct the pipeline on public right-of-way, the location of said facilities shall meet all requirements of the governing authority.

1.22 TIE-IN OF NEW MAINS

A. The tie-in of new mains to an existing main will be completed in the presence of an authorized representative of the Utility Owner. The Owner shall be given proper notice of scheduled tie-ins. All requirements of the tie-ins shall meet the approval of the Owner.

1.23 SANITARY FACILITIES

A. The Contractor shall furnish and maintain portable toilets for construction employees during the construction period. These toilets are to be chemical-type conveniently located and secluded from public view and shall meet the requirements of the State Board of Health and the Federal Safety Construction Act, and shall be maintained in a clean and sanitary condition.

1.24 ACCEPTANCE

A. The Contractor shall notify the Owner when the work is substantially completed, and is ready for testing. The Resident Project Representative shall be given advance notice and shall observe all pipeline testing until all are successfully tested. Final acceptance of the work shall not be given until: acceptable test results conforming to the plans, specifications and governing authorities rules and regulations have been met; approval of the cleanup work is provided by the Owner, Engineer and appropriate governing authority.

1.25 TO QUALIFY FOR PAYMENT

A. To qualify for payment as provided in the General Conditions, the Contractor must:

1. Transfer title of materials, for which payment is requested, to the Owner.

2. Provide the necessary and applicable insurance to protect the Owner's interest in said materials.

1.26 PAYMENTS FOR EXTRA WORK

A. Written notice of claims for payment for Extra Work shall be given by the Contractor within ten (10) days after receipt of instructions from the Owner as approved by the Engineer to proceed with the Extra Work and also before any work is commenced, except in emergency endangering life or property. No claim shall be valid unless so made. In all cases, the Contractor's itemized estimate sheets showing all labor and material shall be submitted to the Engineer. The Owner's order for Extra Work shall specify any extension of the Contract Time and one of the following methods of payment:

1. Unit prices or combinations of unit prices which formed the basis of the original Contract.

2. A lump sum based on the Contractor's estimate, accepted by the Owner, and approved by the Engineer.

3. Cost reimbursement for the actual costs for labor, direct overhead, materials, supplies, equipment and other services necessary to complete the work plus an amount to be agreed upon to cover the cost of the general overhead and profit to be negotiated.

1.27 PAYMENT FOR WORK SUSPENDED BY THE OWNER

A. If the work or any part thereof shall be suspended by the Owner and abandoned by the Contractor, the Contractor will then be entitled to payment for all work done on the portions so abandoned. Payment for the work performed shall be based on one of the following methods of payment:

1. A lump sum based on the Contractor's estimate, accepted by the Owner, and approved by the Engineer.

2. Cost reimbursement for the actual costs for labor, direct overhead, materials, supplies, equipment and other services necessary to complete the work plus an amount to be agreed upon to cover the cost of general overhead and profit to be negotiated.

1.28 GENERAL GUARANTY

A. The Contractor shall guarantee all materials and equipment furnished and work performed for a period of one (1) year from the date of completion and acceptance of the work. The Contractor warrants and guarantees for a period of one (1) year from the date of completion and acceptance of the work that the completed work is free from all defects due to faulty materials or workmanship and the Contractor shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any other damages that were caused by defects in the work.

B. The Owner will give notice of observed defects with reasonable promptness. In the event that the Contractor should fail to make such repairs, adjustments, or other work that may be made necessary by such defects, the Owner may do so and charge the Contractor the cost thereby incurred.

C. In an emergency where, in the judgment of the Owner, delay would cause serious loss or damage, repairs and replacement of defects in the work and damage caused by defects may be made without notice being sent to the Contractor, and the Contractor shall pay the cost thereof.

D. The Performance Bond shall remain in full force and effect through the guarantee period.

E. The warranty provided by the Contractor shall transcend any warranty provided by the manufacturers. This shall remain in effect even if the manufacturer's warranty expires prior to one (1) year from the date of

completion and acceptance of work or if the manufacturer eliminates the product line or ceases business operations.

1.29 LIMITED WARRANTY:

A. All manufacturers furnishing new equipment for the Project shall, in writing, warranty their equipment to be free of defects in materials and factory workmanship for a period of one (1) year, providing the product is properly installed and operated under normal conditions.

B. The warranty shall state that material and labor for repair or parts replacement will be free of charge to the Owner during this period.

1.30 MANUALS:

A. The Contractor shall furnish to the Engineer four (4) complete new manuals which describe the operation and maintenance of each piece of major equipment furnished.

1.31 SUBSURFACE PIPELINES, STRUCTURES AND INFORMATION

A. The Contractor shall notify all owners of subsurface facilities of his planned operations, and shall have such owners locate all facilities prior to construction. Any delays due to conflicts with such facilities shall not be cause for extra payment (marked or unmarked).

1.32 COPIES OF PLANS AND SPECIFICATIONS

A. The Contractor will be furnished without cost to him, two copies of all specifications and drawings, together with any and all addenda thereto. The Contractor shall keep one copy of all such specifications and drawings constantly accessible on the work.

1.33 ITEMS INCIDENTAL TO CONSTRUCTION

A. Any item of work, specified or implied, which does not appear as a specific pay item in the proposal, but is essential to the proper completion of the project, shall be considered incidental to the construction and shall be included in the cost of other items.

1.34 APPLICABLE CODES AND STANDARDS

A. The latest revision of all codes and standards at the time of bid opening shall govern.

B. Applicable codes and standards referred to in these specifications shall establish minimum requirements for equipment, materials, construction, and shall be superseded by more stringent requirements of drawings and specifications when and where they occur.

C. Any conflicts between specifications and applicable codes and standards shall be referred to the Engineer for a decision thereon.

1.35 SUBSTITUTIONS, "OR EQUAL" PROJECTS

A. The Bidder is to prepare his Bid based upon equipment and materials which meet the specifications and requirements for the same, as specified and indicated on the drawings. No request for acceptance or approval of equipment or materials will be entertained prior to the opening of bids. The Contractor shall be responsible for using equipment and materials which meet the specifications and requirements as indicated on the drawings.

B. The Contractor shall submit all shop drawings and product information after award of a contract for approval of equipment and materials. The proposed product cannot be used until it is approved by the Engineer.

C. In all cases, the Engineer shall be the sole judge as to whether a proposed product is to be approved and the Contractor shall have the burden of proving, at his expense, to the satisfactions of the Engineer, that the proposed product is similar and equal to the named product. In making such determination, the engineer may

establish such criteria as he may deem proper that the proposed product must meet in order for it to be approved.

D. Where the Engineer approves a product proposed by the Contractor, and such product requires a revision or redesign of any part of the work covered by the Contract, all such revision and redesign and all new drawings and details required therefore, shall be subject to the approval of the Engineer, and shall be provided by the Contractor at his own expense. If an approved substitution of a product requires a different quantity and/or arrangement of ductwork, piping, wiring, or any part of the work from that in the Contract Documents, the Contractor shall provide the same at his own expense.

E. Whenever any product is specified in the Contract Documents by a reference to the name, trade name, make or catalog number of any manufacturer or supplier, the intent is not to limit competition, but to establish a standard or quality which the Engineer has determined is necessary for the Project. The words "or equal", if not stated, are implied.

F. On several occasions, the project has been designed around specific equipment. This equipment is listed as the primary equipment. The secondary equipment, or equipment manufacture, is a quality product that meets the requirements of the project but may require alterations to the project, site, or process. This is typically a result of the uniqueness of the product as other manufacturers may have different dimensions, materials, process requirements and so forth that, while compatible with the project as a whole and of equal quality to the product specified, are significantly different enough that it would require parallel plans or specifications. This does not mean that other products may not be accepted as an equal, rather, it simply reflects the design limitations produced by the inherent uniqueness of some products. However, as stated above in paragraph D, any significant costs resulting from the product substitution shall be borne entirely by the Contractor.

1.36 RIGHT OF ENTRY

A. The authorized representative and agents of the Owner, Engineer, Illinois Environmental Protection Agency (IEPA), Community Development Block Grant (CDBG) and Rural Development (RD), shall be permitted to inspect and have access to all work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records.

2.00 PRODUCTS

A. Not Applicable

3.00 EXECUTION

A. Not Applicable

END OF SECTION 01110

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01270 - UNIT PRICES

1.00 GENERAL

A. All work completed under this Contract will be measured by the Owner or his authorized representative with the assistance of the Contractor. The method of measurement shall be as described in this Section of the specifications. Payment shall be made to the Contractor, as specified in the General Conditions.

B. An itemized estimate of quantities is listed in the Bid Proposal. These quantities are the result of careful calculations and are believed to be correct, but are given only as a basis of comparing bids for award of the Contract, without guarantee that the actual quantities will agree therewith. Payment to the Contractor will be made on the basis of the actual quantities constructed and is understood that the proposed quantities may be increased or decreased without invalidating the unit bid prices; further that the Contractor hereby forfeits all rights of action to recover any anticipated profits occasioned by such increase or decrease in quantities.

C. All work to be done by the Contractor, as shown in the drawings and described in the specifications, including any and all minor details not specifically shown or described but obviously essential to the proper completion of the work, shall be considered as subsidiary to and included with the work for which prices are named in the contract documents. The Contractor shall not be entitled to any extra or additional compensation for such unless otherwise specified. Work for which there is not a pay item will be considered incidental to the Contract and no additional compensation will be allowed.

D. There will be no payment for any periodic estimate until the Owner has received the following submittals:

1. List of Subcontractors.
2. Progress and Payment Schedule.
3. A complete breakdown of the Contractor's proposal.

E. The periodic payment requests will be made on forms provided by the Owner or other approved means.

1.01 MOBILIZATION

A. This item of work shall consist of moving all materials, labor, and equipment to the jobsite, and setting up the equipment and tools needed to commence work.

B. Payment shall be made at the contract Lump Sum (LS) price bid for the following:

1. Item #1 – Mobilization

1.02 CHIP SEAL ACCESS ROAD MODIFICATIONS AND PARKING AREAS

A. This item of work shall consist of furnishing all labor, material, and equipment required to provide and install the access road, parking area and any gravel paved surfaces intended for vehicular traffic and any other incidental items necessary to complete this item of work according to the plans and specifications.

B. Measurement shall be made as one complete system installed and in-place.

C. Payment shall be made at the contract Lump Sum (LS) price bid for the following:

1. Item #2 – Chip Seal Access Road Modifications and Parking Areas

1.03 HEADWORKS BAR SCREEN/GRIT REMOVAL STRUCTURE

A. This item of work shall consist of furnishing all materials, labor, and equipment required to install the new doghouse influent manhole and piping, slide gates, mechanical bar screen, coarse manual bypass screen, and grit removal/dewatering equipment. Work shall include electrical connections, wiring, conduit, grouting and any related items necessary to complete this work item.

B. Measurement shall be made as one complete system installed and in-place.

C. Payment shall be made at the contract Lump Sum (LS) price bid for the following:

1. Item #3 – Headworks Bar Screen/Grit Removal Structure

1.04 INFLUENT LIFT STATION AND PIPING

A. This item of work shall consist of furnishing all materials, labor, and equipment required to construct an influent lift station for the purpose of pumping the influent to the primary clarifiers. Work shall include the installation of **two (2)** dry flow pumps and **two (2)** wet flow pumps, as specified below. Also provisions shall be included in the structure for **two (2)** additional pumps to be added at a later date. Also included with this item will be the joist, valve pit, meter pit, valves, piping, meters and all related items necessary to complete this work item.

1. Dry Flow Pumps:
   a) FLYGT Model NP-3153.181 4" Pumps, 20 HP, 460 V, 3 Phase, 462 Impeller, 3" Guide Bracket and 50' Submersible Pump Cable.
   b) All mounting hardware, guides, brackets, cable holders or related items needed to install pumps shall be included per manufacturers recommendations and shall be Stainless Steel

2. Wet Flow Pumps:
   a) FLYGT Model NP-3202.185 6" Pumps, 45 HP, 460 V, 3 Phase, 462 Impeller, 3" Guide Bracket and 50' Submersible Pump Cable.
   b) All mounting hardware, guides, brackets, cable holders or related items needed to install pumps shall be included per manufacturers recommendations and shall be Stainless Steel

3. All details shown in drawings shall apply.

4. See Section 11850 for detailed pump specifications

B. Measurement shall be made as one complete system installed and in-place.

C. Payment shall be made at the contract Lump Sum (LS) price bid for the following:

1. Item #4 – Influent Lift Station and Piping

1.05 HEADWORKS MOTOR CONTROL CENTER

A. This item of work shall consist of furnishing all materials, labor, and equipment required to install a new headworks motor control center. Work shall include installation of the MCC and any related items, appurtenances and electrical work necessary to connect the MCC with applicable headworks equipment.

B. Measurement shall be made as one complete system installed and in-place.

C. Payment shall be made at the contract Lump Sum (LS) price bid for the following:

1. Item #5 – Headworks Motor Control Center

1.06 PRIMARY AND SECONDARY CLARIFIER DRIVE REPLACEMENT AND BRIDGE REPAINTING

A. This item of work shall consist of furnishing all materials, labor, and equipment required to replace the existing primary and secondary clarifier drives and repainting of the bridges on all four clarifiers. There are four (4) total drives included in this bid item. Work shall include drainage of the basins, removal of old drives, installation of new drives, electrical work, conduit, motor testing, repainting of the bridges and any incidental items necessary to complete this item of work.

B. Measurement shall be made as one complete system installed and in-place.

C. Payment shall be made at the contract Lump Sum (LS) price bid for the following:

1. Item #7 – Primary and Secondary Clarifier Drive Replacement and Bridge Repainting

1.07 CHLORINATION BASIN DRIVES REPLACEMENT AND BRIDGE REPAINTING

A. This item of work shall consist of furnishing all materials, labor, and equipment required to rehabilitate the chlorination basin. Work shall include drainage of the basin, removal of old drive, installation of new drive, electrical work, conduit, motor testing, repainting of the bridge, and any incidental items necessary to complete this item of work.

B. Measurement shall be made as one complete system installed and in-place.

C. Payment shall be made at the contract Lump Sum (LS) price bid for the following:

1. Item #8 – Chlorination Basin Drive Replacement and Bridge Repainting

1.08 AIR HEADER REHAB / MAIN AIR HEADER REPLACEMENTS

A. This item of work shall consist of furnishing all materials, labor, and equipment required to make modifications to the air header from the blower building to the main aeration basin and aerobic digester and construct a new main air header for the facility. Work shall include removal of existing air pipe, installation of new pipe, building modifications, excavation, piping, fittings, concrete piers, supports, bedding, backfill, landscaping, gravel, landscape fabric as specified in plans, restoration of disturbed ground and any related items or labor necessary for the completion of this work.

B. Payment shall be made at the contract Lump Sum (LS) price bid for the following:

1. Item #9 – Air Header Rehab / Main Air Header Replacements

1.09 NEW MAIN MCC / ELECTRICAL

A. This item of work shall consist of furnishing all labor, material, and equipment required to relocate the existing power poles on site so that they do not impede daily operations, install the service connection from new power supply to the building, provide and install all electrical connections, motor control center equipment, electrical service conduit, generator with concrete pad, etc. and any other incidental items necessary to completing this item of work according to the plans and specifications.

B. Measurement shall be made as one complete system installed and in-place.

C. Payment shall be made at the contract Lump Sum (LS) price bid for the following:

1. Item #10 – New Main MCC / Electrical

1.10 NON-POTABLE WATER SYSTEM

A. This item of work shall consist of furnishing all labor, material, and equipment required to install a non-potable service, two (2) water jet pumps, pressure tank, non-potable water main extension and replace existing hydrants, secondary connection to existing potable water system with reduced pressure zone

backflow prevention assembly. Work shall include any related items needed for the completion of this item of work.

B. Measurement shall be made as one complete system installed and in-place.

C. Payment shall be made at the contract Lump Sum (LS) price bid for the following:

1. Item #11 – Non-Potable Water System

1.11 TERTIARY FILTER PUMP ROOM DRAIN LINE

A. This item of work shall consist of furnishing all labor, material, and equipment required to install a drain line at the tertiary filter pump room as shown on the plans. Work shall include all necessary piping, fittings, appurtenances, excavation, bedding, backfill, etc. and any other incidental items necessary to completing this item of work according to the plans and specifications.

B. Measurement shall be made as one complete system installed and in-place.

C. Payment shall be made at the contract Lump Sum (LS) price bid for the following:

1. Item #12 – Tertiary Filter Pump Room Drain Line

1.12 SITE / MASTER SCADA TWO (2) REMOTE LIFT STATIONS

A. This item of work shall consist of furnishing all labor, material, and equipment required to provide and install the SCADA System equipment, connect two (2) remote lift stations (Country Roots and Industrial Park), and any other incidental items necessary to completing this item of work according to the plans and specifications.

B. Measurement shall be made as one complete system installed and in-place.

C. Payment shall be made at the contract Lump Sum (LS) price bid for the following:

1. Item #13 – Site / Master SCADA Two (2) Remote Lift Stations

1.13 DOORS, WINDOWS, FACIA, SOFFIT AND BRICK MAINTENANCE ON EXISTING BUILDINGS

A. This item of work shall consist of furnishing all labor, material, and equipment required to rehabilitate buildings on site. Work shall include new doors, windows, fascia, soffit, tuck pointing, caulking, sealing and any other items incidental to the successful completion of work as described in the specifications and plans.

B. Measurement shall be made as one complete system installed and in-place.

C. Payment shall be made at the contract Lump Sum (LS) price bid for the following:

1. Item #14 – Doors, Windows, Fascia, Soffit, and Brick Maintenance on Existing Buildings

1.14 SITE RESTORATION / FENCING

A. This item of work shall consist of furnishing all labor, material, and equipment required to restore all exposed areas of soil and install fencing around areas as shown in the plans. Work shall include final grading, fertilizing, seeding with specified groundcover, mulching, erosion protection, chain link fencing, gates, corner posts, signage, and any other incidental items necessary to complete this item of work according to the plans and specifications.

B. Measurement shall be made as one complete system installed and in-place.

C. Payment shall be made at the contract Lump Sum (LS) price bid for the following:

1. Item #15 – Site Restoration / Fencing

1.15 DEMOLITION OF OLD HEADWORKS

A. This item of work shall consist of furnishing all labor, material, and equipment required to demolish the old headworks system. Work shall include demolition of the structures, removal of structures, final grading, and site restoration as described in **1.16** of this section.

B. Payment shall be made at the contract Lump Sum (LS) price bid for the following:

1. Item #16 – Demolition of Old Headworks

1.16 MISCELLANEOUS SPARE PARTS

A. The following items are required to be furnished by the Bidder as part of the Project.

B. Payment for the spare parts shall be made at the following unit price by the City of Pittsfield.

1. Item #17 – Specification 09511/1 – Suspended Acoustical Ceiling - 2 x 2 Ceiling Tile – Square Feet

2. Item #18 – Specification 11322/4 – Grit Screw
   a) #18a – Hanger Bearing Inserts - Each
   b) #18b – Bubble Diffusers - Each
   c) #18c - Blower V-Belts - Each

3. Item #19 – Specification 11332/6 – Auto Bar Screen
   a) #19a – Rake Bars - Each
   b) #19b – Chain - Each
   c) #19c – Wiper Arm Wear Pads - Pair

4. Item #20 – Specification 16620/3 – Clarifier Drives – Shear pins for each drive - Each

1.17 OTHER ITEMS:

A. Many items required to complete this project do not have separate bid items. Items such as concrete thrust blocking, pipe fittings, bends, adaptors, freight, handling, permits, excess earth, granular backfill, disinfection, flushing, filling, testing, etc. are shown on the drawings or specified. These items are to be completed; however, no direct payment shall be made as the cost should be included in other bid items.

2.00 PRODUCTS

A. Not Applicable

3.00 EXECUTION

A. Not Applicable

END OF SECTION 01270

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01450 - QUALITY CONTROL

1.00 GENERAL

1.01 SECTION INCLUDES

A. Contractor's responsibility for quality assurance, control of the installation of improvements, field sampling, inspection services, manufacturer's field services and reports.

1.02 SUMMARY

A. All materials and each part of the work shall be subject to inspection by the Owner's Representative.

B. The Owner's Representative shall be allowed access to all parts of the work and shall be furnished with information and assistance, by the Contractor, as required to make a complete and detailed inspection.

1.03 QUALITY ASSURANCE CONTROL OF INSTALLATION

A. It is the Contractors responsibility to monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of quality equal to or exceeding that specified.

B. The Contractor shall comply fully with manufacturer's instructions, including each step in sequence.

C. If the manufacturer's instructions are in conflict with the contract documents, the Contractor shall request clarification from the Owner's Representative before proceeding.

D. The contractor's work shall comply with specified standards. The standards define the minimum quality for the work.

E. Qualified persons shall perform all work of specified quality.

1.04 FIELD SAMPLES

A. The Contractor shall install field samples at the site, when specified, for review prior to installation of the item.

B. Samples accepted by the Owner's Representative shall represent the quality level for the work.

C. Field samples shall be removed and the area cleared after the Owner's Representatives has accepted the field samples, unless specifically permitted to remain.

1.05 INSPECTION AND TESTING SERVICES

A. Contractor shall give Owner's representative a 72-hour notice of readiness for all required inspections, tests, or approvals, including startup or system activation of equipment.

1. Contractor shall notify the Owners representative by 3:00 p.m. of the preceding day if he will not be ready for a previously scheduled inspection. The Contractor may be responsible for the cost of additional inspections if this notification is not made.

2. The Contractor shall provide the Owner's Representative one-week notice for pre-final and/or final inspection.

B. Inspection fees will be the responsibility of the Owner unless otherwise stated in the Contract Documents. There shall be no direct charge to the Owner for materials taken as samples, either for field or laboratory tests.

Clarification: a. Section 01450, 1.05, C. shall be clarified as shown below:
Testing will conform to the current standard specified to assure quality. The Owner's Representative will determine frequency of testing. The Contractor is responsible for all fees associated with testing. per Add # 1

C. Testing will conform to the current standard specified to assure quality. The Owner's Representative will determine frequency of testing.

D. This section shall not relieve the Contractor from his responsibility to provide certifications and substantiating test reports, from a supplier or fabricator.

E. If the Contract Documents include the Contractor providing reports or testing, the Contractor shall retain the services of an independent testing firm. Test results or reports will be submitted to the Owner's Representative, indicating observation and results of tests and compliance or noncompliance with Contract Documents.

1. If a test is not in conformance, the same independent firm shall perform re-testing.

1.06 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. When required by specifications or drawings, product suppliers or manufacturers shall provide qualified staff or personnel for field services. Services may include providing instructions, observing site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, testing, adjusting, and balancing of equipment.

B. The Contractor shall report to the Owner's Representative observations, site decisions, or instructions from the manufacturer's personnel that is supplemental or contrary to manufacturer's written instructions.

C. The Contractor shall review, approve, and submit the manufacturer's report within 14 days of observation to Owner's Representative for his review.

2.00 PRODUCTS NA

3.00 EXECUTION NA

END OF SECTION 01450

DIVISION 2 - SITE CONSTRUCTION

SECTION 02080 - UTILITY MATERIALS

1.00 GENERAL

1.01 DESCRIPTION OF WORK

A. The work to be performed under this section consists of furnishing all materials, equipment, supplies and tools necessary for the construction of the water piping, sewer force main, gravity sewer, or process piping, included in this Contract, complete with valves, accessories and all necessary components.

B. All work shall be completed in accordance with the project plans and details.

C. Applicable Sections: 02315 Excavating, Filling and Grading, 09900 Paints and Coatings.

1.02 QUALITY ASSURANCE

A. Work shall conform to all local building codes.

B. All codes referred to are those listed by:

1. American Society for Testing Materials (ASTM).
2. American Water Works Association (AWWA).
3. American Standards Association (ASA).
4. Commercial Standards (CS).
5. American Association of State Highway & Transportation Official (AASHTO).
6. Federal Specifications.

C. Codes and standards referred to above shall be the current edition that is being used at the time of bid opening.

D. All materials and equipment used on this work shall be new, of the best quality and shall meet the requirements of these specifications. Materials shall be sampled and tested in accordance with current ASTM Specifications or such others as specified hereinafter. The Contractor will be required to furnish certificates of conformance to ASTM or other applicable specifications. Materials shall be stored in such a manner that their conditions are still equivalent to new when installed.

E. Submittals on pipe, valves and other accessories shall include manufacture, pressure class, materials of construction, reference AWWA or ASTM Standards the equipment complies with, and catalog cuts or shop drawings showing layout dimensions.

F. Whenever in these specifications reference is made to the requirements of the ASTM AWWA, ASA, or other standard specifications, it shall be understood that references are made to the latest modifications or revisions of such specifications.

G. All material to be used in this work will be inspected before being placed and all rejected material must be removed immediately and not used in the work under this contract. Any material installed or placed without inspection shall be removed and replaced with new materials if so directed by the Inspector.

H. The Contractor shall be required to furnish such laborers as may be necessary to aid the Inspector in the examination and culling of material.

I. The Contractor shall pay for all tests required by the specifications. Such tests shall be performed by a competent independent laboratory approved by the Engineer on test specimens selected by the

Contractor under the direct supervision of the Engineer. Copies of all test results shall be submitted to the Engineer directly from the testing laboratory.

2.00 PRODUCTS

2.01 DUCTILE IRON PIPE

A. Ductile iron pipe shall conform to ANSI/AWWA C150/A.21.50 and ANSI/AWWA C151/A21.51 or ANSI/AWWA C115/A21.15 for flanged pipe. Minimum thickness class shall be Class 52 (Class 53 for flanged pipe). The pipe shall be manufactured from a grade of iron having a minimum mechanical property of 60,000 psi tensile strength, 42,000 psi yield strength, and a minimum of ten percent (10%) elongation.

B. Mechanical joints or push-on joints conforming to ANSI Spec. A21.51 or A21.11 AWWA for all buried pipe unless otherwise specified or indicated.

C. Flanged joints shall be used for all interior and exposed exterior pipe except where otherwise specified or indicated, conforming to ANSI/AWWA C115/A21.15.

D. Restrained ductile iron pipe shall be similar to American Cast Iron Pipe Co. - Lok-Fast joint, U.S. Pipe and Foundry Co. - Field Lok joint, or approved equal for pipe sizes 4" and larger. Restrained ductile iron pipe for pipe sizes smaller than 4" shall be mechanical joint with retainer gland.

E. Water line shall be cement-lined and seal-coated in conformance with ANSI Spec. A21.4 and AWWA C104. Sewer pipe shall also be cement-lined and seal coated.

F. Fittings: Furnish ells, tees, reducers, wyes, couplings, crosses, transitions and end caps and plugs of the same type and class of material as the ductile iron pipe, or of material having equal or superior physical and chemical properties as acceptable to the Engineer.

1. Conform to ANSI A21.10 with a 350 psi pressure rating.

2. Fittings for pipe with mechanical joints shall have mechanical joints.

3. Include all specials, taps, plugs, flanges, adapters and wall fittings, as required.

G. Refer to Paints and Coatings, Section 09900 for D.I.P. coating systems where applicable.

H. Couplings:

1. Furnish where indicated or required to make corrections.

2. Coupling material shall be iron for joining ductile iron pipe.

3. Couplings shall be solid-sleeve type with mechanical joint conforming to one of the following:

   a) Ford Style FCI, Ford Meter Box Co., Wabash, Indiana.
   b) Dresser Style 153, Dress Mfg. Division, Bradford, PA.
   c) Or equal.

4. Bodies, rings, glands and bolts shall be ductile iron.

5. Sleeves shall be without pipe stop.

I. Gaskets and Bolting Materials:

1. Provide all gaskets, bolts, lubricants and other accessories required to install pipe, fittings and specials, complete and ready for service.

2. Gaskets for flanged joints: Conform to ANSI B16.21, 1/8" thick full face red rubber.

3. Bolts for flanged joints: Conform to ASTM A307, Grade B. Nut and bolt heads shall be hexagonal.

2.02 STEEL PIPE

A. Steel pipe shall conform to ASTM A53, Grade B Seamless, Schedule 40.

B. Fittings shall be Schedule 40 carbon steel butt welding L.R. elbows, caps and reducers, ASTM A234, Grade WPB.

C. Flanges shall be forged, carbon steel, 150# ANSI welding neck, F&D, RF, per ASTM A181, Grade 1.

D. Bolts shall conform to ASTM A307, Grade B heavy hex head bolts with heavy hex nuts.

E. Gaskets shall be 1/8" thick durable.

F. Galvanized steel pipe shall conform to ASTM A 120-72A, hot-dipped zinc-coated (galvanized) welded and seamless steel pipe for ordinary uses.

2.03 COPPER TUBING

A. Tubing: Copper tube ASTM B88, hard drawn, Type K, seamless in straight lengths or coils.

B. Fittings: L.R. elbows, tees, caps, reducers, couplings, copper tube to threaded adapters (MPT) and unions-all to be wrought copper fittings for silver brazing per ANSA B16.22.

C. Flanges: 2" and below: 150# bronze screwed flanges per ANSI B16.24 with wrought copper tube to threaded adaptors listed above.

2.04 POLYVINYL CHLORIDE PIPE (PVC) - SDR RATED: (Pressure Pipe)

A. Rigid PVC pressure pipe as described in this specification is designed to carry pressures (including surge) up to the maximum class rating.

B. Material used to produce the pipe, couplings and fittings shall conform to ASTM D1784, Type 1, Grade 1, 2,000 psi design stress.

C. The standard dimension ratio for the pipe shall be SDR 21 (Class 200) unless otherwise indicated.

D. Standard lay length shall be 20 feet. No pipe lengths shall be less than 10 feet.

E. All pipe shall conform to the latest revisions of the following specifications:

1. ASTM Specification D2241.

2. Department of Commence PS22-70 (SDR-PR) (Pressure-Rated Pipe).

3. National Sanitation Foundation Testing Laboratories (NSF).

4. Rubber gasketing shall conform to ASTM F-477.

5. Only elastomeric ring seals are to be used in joining pipes. The elastomeric ring seal joint shall conform to ASTM D3139. The joints shall have been tested and approved by the National Sanitation Foundation and certification of said approval shall be submitted to the Engineer.

F. Markings:

1. Pipe markings shall include the following, marked continuously down the length.
   a) Manufacturer's Name
   b) Nominal Size
   c) Class Pressure Rating
   d) Dimension Ratio Number

e) PVC 1120
f) NSF Logo
g) Identification Code

G. Storage:

1. Avoid storage of pipe in direct sunlight for extended periods of time. If field storage for more than a month is required, cover pipe to protect from exposure to sunlight.

H. Lubrication:

1. Lubrication shall be water soluble, non-toxic, be non-objectionable in taste and odor imparted to the fluid, be non-supporting of bacteria growth and have no deteriorating effect on the PVC or rubber gaskets.

I. Fittings:

1. Furnish ells, tees, reducers, wyes, couplings, crosses, transitions and end caps and plugs of the same type and class of material as the fittings specified in DUCTILE IRON pipe, or of material having equal or superior physical and chemical properties as acceptable to the Engineer unless otherwise indicated.

2. P.V.C. fittings will **not** be accepted for buried installation.

J. Bell Depth:

1. The bell depth/entry dimension of the SDR rated pipe shall not be less than the following dimensions.

2" diameter - 4.00"
3" diameter - 4.84"
4" diameter - 5.00"
6" diameter - 6.25"
8" diameter - 6.37"

2.05 POLYVINYL CHLORIDE PIPE (PVC) SCHEDULES 40, 80 & 120 (Pressure Pipe)

A. Pipe:

1. Shall conform to ASTM D1785, Type I, Grade I, Schedule 40, 80 or 120 as indicated.

2. Shall conform in all respects to product standard PS21-70.

3. Shall bear the National Sanitation Foundation (NSF) seal of approval.

4. Shall be homogeneous throughout and free from cracks, holes, foreign inclusions or other defects.

B. Joints:

1. Socket-type solvent welded according to manufacturer's recommendations.

2. Threaded where indicated or required.

3. Flanged where indicated or required, conforming to ANSI Class 125 standard drilling.

C. Fittings:

1. Shall be of the same material as the pipe, and in no case shall have thinner walls than that of the pipe furnished. Preference will be given to the use of extruded fittings. Where molded fittings

must be used, they shall be equal to those produced by the Sloane Manufacturing Co. All fittings must be NSF approved.

D. Storage:

1. Avoid storage of pipe in direct sunlight for extended periods of time. If field storage for more than a month is required, cover pipe to protect from exposure to sunlight.

2.06 POLYVINYL CHLORIDE PIPE (PVC) - SDR 35 and SDR 26: (Gravity Sewer)

A. 15" Pipe and Smaller: Polyvinyl chloride plastic gravity sewer pipe with integral wall bell and spigot joints shall be made from clean, virgin, approved class 12454-B or 12454-C PVC compound conforming to ASTM Resin Specifications D1784. All pipe shall comply with ASTM Specifications 3034 made to SDR 35 or SDR 26 dimensions. The integral bell shall consist of an integral wall section stiffened with a PVC retainer which securely locks the solid cross section rubber ring into position. All fittings and accessories shall be as manufactured and furnished by the pipe supplier.

B. Pipe Larger than 15": Polyvinyl chloride plastic gravity sewer pipe with integral wall bell and spigot joints shall be made from clean, virgin, approved class 12364-C or 12454-C PVC compound conforming to ASTM Resin Specification D1784. All pipe shall comply with ASTM Specification 679. The integral bell shall consist of an integral wall section stiffened with a PVC retainer which securely locks the solid cross section rubber ring into position. All fittings and accessories shall be as manufactured and furnished by the pipe supplier.

2.07 POLYVINYL CHLORIDE PIPE (RESTRAINED JOINT PVC):

A. Restrained joint PVC pipe shall be equal to Certain Teed's Certa-Lok Yelomine restrained joint PVC pressure pipe meeting dimensional requirements of ASTM D2241. Joints are to meet the requirements of ASTM D3139 and ASTM F477. Pipe shall be NSF approved.

B. Couplings used to connect to the non-restrained joint PVC pipe shall be at least 18" long.

2.08 FLANGE ADAPTERS

A. Flange adapters shall consist of gray cast iron flanges for 12" and smaller pipes, steel flanges for larger than 12" pipe, with ductile iron follower flanges. The bolt circle, bolt size, and spacing shall conform to ANSI Standard B16.1 for 125 pound flanges. Gaskets shall be synthetic rubber. "O" rings shall be neoprene. Each flange adapter shall be furnished with four or more anchor studs where noted on the plans.

2.09 MECHANICAL JOINT RESTRAINT

A. The mechanical joint restraint shall be designed for use on cast iron or ductile iron piping. The unit shall be provided with setscrews giving restraint against the pressure force. It shall be Series 1100 Megalug, Series 3000 Stargrip or approved equal.

2.10 VALVES

A. Resilient Wedge Gate Valves:

1. All gate valves shall be non-rising stem, ductile-iron body and wedge, bronze trim and stem, resilient seat gate valves conforming to AWWA C509 or C515, unless otherwise indicated. The valve shall have a rubber encapsulated ductile iron wedge. The valve shall be coated with fusion bonded epoxy inside and out. The valve stem seal shall have three "O" –rings (one lower and two upper) and shall contain two anti-friction (thrust) washers. The valve shall be as supplied by Mueller, Clow, or approved equal.

2. Valve ends shall be compatible with the pipe in which they are installed. Tapping valves shall be flanged by mechanical joint and shall be compatible with the specified tapping sleeve.

3. All valves shall open left (counterclockwise) and have an operating nut capable of being turned by a standard gate valve key for buried valves and a handwheel for exposed valves.

4. Each buried valve shall have a cast-iron (bituminous coated) valve box. Valve box shall be two-piece, screw type, 5 1/4" shaft, cast-iron collar and lid and shall be of the length suited to the valve depth.

5. All valves with a bury depth in excess of 6' shall have an extension stem installed. Stem extensions shall be Mueller A-26441 or approved equal, or Mueller A-26440 or approved equal for applications with handwheel actuators.

B. Swing Type Spring and Lever Check Valve:

1. The swing type gravity operated check valve shall be an iron body, bronze mounted meeting all applicable parts of ANSI/AWWA C 508 standard. The valve disk facing shall be bronze.

2. The valve shall include a lever that can be installed on either side of the valve which includes an adjustable spring to control the opening and closing of the clapper.

3. The valves shall have flanged ends manufactured in accordance with ANSI B 16.1 Class 125/150, including facing, drilling and flange thickness.

4. The swing flap check valve shall be catalog number A-2600-6-02 as manufactured by Mueller Co. or Catalog Number 106LS as manufactured by Kennedy Valve Company.

C. Butterfly Valves:

1. Butterfly valves shall be of the flangeless wafer body style, suitable for use with ANSI B16.1, Class 125 pound flanges. Wafer body shall be cast iron or ductile iron with disc of cast iron and welded nickel edges. The valve shall be rated at 175 psi and provide drip-tight shut-off at differentials up to 175 psi. All valves shall conform to the latest revision of AWWA Standard C-504.

2. Lug body valves shall have retained seat and shall provide tight shutoff up to the full valve rating on dead end or isolation service without the use of downstream flanges.

3. All valves shall be furnished with self lubricated bearings of TFE coated stainless steel. Shaft seals shall be provided to prevent leakage and to protect bearings from internal or external corrosion.

4. Seats shall be of the reinforced resilient type and shall be field replaceable. Seats shall also act as a body liner to prevent flow from contacting the body casting. Seats shall have flange sealing to provide a positive seal without use of flange gaskets.

5. Seats shall be of hycar suitable for use with water. For dry air service, the seat shall be EPDM and suitable for air service at 170 degrees F. All seats shall be field replaceable, without the need for special tools. Shafts shall be one piece and shall be of 316 stainless steel. Shaft diameter shall meet the 75B standard from AWWA Specification C504-87 for butterfly valves. Shafts shall be finish ground to minimize bearing and shaft seal wear. Shafts of 16" and larger valves shall have a non-adjustable thrust collar. The disc-to-shaft connections shall be type 316 machined and completely interchangeable.

6. All valves shall be coated with HP epoxy or equal, in conformance to AWWA Standard C550, latest revision. Interior wetted ferrous surfaces shall be coated, a nominal 10 mils thick for long life; and body exterior shall have a minimum 3 to 4 mils coating thickness in order to provide protection in shipment and storage, and to afford a superior base for field-applied finish coats. Valves shall be DeZurick Figure 632, Keystone Model 990/920, or approved equal.

D. Ball Valves:

1. Furnish and install ball valves 3" and smaller as shown on the drawings. Valves shall be manufactured by Watts Regulator Company or approved equal.

2. Stainless Steel Ball Valve:

a) Stainless steel ball valves shall be constructed of a two (2) piece full port design, have an adjustable stem packing, reinforced PTFE seats, PTFE stem packing, thrust washer and body seal.

b) The handle shall lock in the open or closed position and shall be vinyl coated.

c) Valve must conform to MSS-SP-110 and API-598.

d) Valves shall be Watts Regulator Company Series S-FBU-1 or approved equal.

3. Bronze Ball Valve:

a) Bronze ball valves shall be a two (2) piece full port design constructed of a forged brass body and end adapter.

b) Ball shall be chrome-plated brass.

c) Seats and stem packing shall be Virgin PTFE with the stem having a fluorocarbon o-ring.

d) Valves with top loaded stems or valves without adjustable packing will not be accepted.

e) Valves must conform with MSS-SP-110.

f) Valves shall be Watts Regulator Company Series FBU-4 (threaded), FBUS-4 (solder), Apollo Model 70-100 (threaded), Model 70-200 (solder), or approved equal.

E. Ball Check Valves:

1. Manufactured by Flygt.

2. Cast iron body conforming to ASTM A159, Class 35.

3. Flat faced flanges conforming to ANSI B16.1, Class 125.

4. Ball shall be sinking type made of hollow stainless steel with vulcanized nitril rubber coating.

5. Suitable for sewage application with 145 psi maximum working pressure.

F. Eccentric Plug Valves:

1. Manufactured by DeZurik, Kennedy, or approved equal.

2. Materials and Construction:

a) Body: Cast iron construction with semi-steel body or equivalent material to operate under abrasive service.

b) Nonlubricated eccentric type.

c) Plug: Resilient lined with minimum opening 80% of pipe area.

d) Flanged ends, conforming to ANSI B16.1, Class 125 or M.J. as indicated in valve list.

e) Operators shall be lever or wrench actuated unless specified otherwise in valve list and hold valve in position without creeping.

f) Where indicated, handwheel gear operators shall be supplied. All gearing shall be enclosed in semi-steel housing with lubricant; seals provided on all shafts to prevent entry of dirt and water.

g) Bearings: Stainless steel, permanently lubricated.

h) Packing Box: Suitable for replacement or adjustment while valve is in service.

i) Arrow provided to indicate valve position.

G. GATE AND GLOBE VALVES (2" AND SMALLER):

1. Furnish and install gate and globe valves 2" and smaller as shown on the drawings. Valves shall be as manufactured by Crane, Powell, or approved equal.

2. Design gate and globe valves (2" and smaller) according to the following:

a) 200-lb. rating.
b) Bronze body materials, ASTM B61.
c) Screwed Ends.
d) Rising stem.
e) Union bonnet.
f) Double wedge.
g) Integral seats.

2.11 VALVE OPERATORS

A. Valves shall be available with field interchange manual actuators as required and as shown on the drawings.

B. The manual valve operators shall be rotary manual actuators utilizing a handwheel. The manual actuator shall be cast iron construction with a valve position indicator utilizing enclosed construction. Each manual operator will provide an adjustable open and closed position stop with provision to prevent accidental adjustment changes.

2.12 VALVE BOXES

A. Valve boxes shown on the drawings for 4" and larger sizes shall be cast iron, buffalo type, 2-piece screw type with 5-1/4" shaft of a length suited to the valve depth. The cast iron lid shall have either the word "sewer", "water", or "drain" cast in it to suit the service of the valve. The base of the boxes shall be round and of the proper size for the valves. Smaller sized boxes may be used for 3" and smaller size valves providing the Contractor can demonstrate their suitability for the conditions of their use.

2.13 FLUSH HYDRANT

A. The flush hydrant shall have full draining capabilities and shall be frost proof.

B. The flush hydrant shall have a 2½ " NST nozzle, a locking cover, a 2" Mechanical Joint inlet and shall use brass for all moving parts.

C. Bury depth shall be four foot (4').

2.14 NON-POTABLE YARD HYDRANTS

A. The frost proof yard hydrant shall be a Simmons Manufacturing Series 800, Model 804, or a Kupferle Model 903 with a four foot (4') bury depth.

B. The hydrant shall have a 3/4" iron pipe threaded inlet and a 3/4 " threaded brass outlet nozzle to accept a standard hose connector.

C. The hydrant shall have a handle that can be padlocked and a handwheel to lock the flow rate at a desired rate.

2.15 REDUCED PRESSURE ZONE ASSEMBLY

A. The reduced pressure zone assembly shall be a 2" Watts Series 919 or approved equal.

B. The assembly shall consist of a pressure differential relief valve located in a zone between two positive seating check valves. Seats and seat discs shall be replaceable in both check valves and the relief valve without the use of special tools. Service of all internal check valve components shall be through top mounted access bronze covers threaded to the main valve body. The check valve poppet assembly shall be guided via the use of a corrosion resistant plastic guide. The check valve and relief valve seats shall be push-in type. The relief valve cover shall be bronze construction secured with stainless steel bolts and shall utilize a quarter-turn locking joint to capture the spring load of the relief valve. The relief valve shall have an internal sensing line to sense the inlet water supply. All rubber elastomers shall be of chloramine resistant material. The assembly shall also include two resilient seated isolation valves, four top-mounted resilient seated test cocks and an air gap drain fitting.

2.16 PRESSURE TANK WITH PUMP CONTROLS

A. The pressure tank shall be 120 gallons made with high strength steel, 150 psig, and a durable stand. The pressure tank shall be supplied with a controller capable of rotating operation of the two pumps and digital pressure gauge adjustable up to 80 psig. The pressure tank shall come with all necessary controls, wiring and piping to connect to the pumps and the existing non-potable water system. The pressure tank shall be Well-X-Troll or approved equal.

3.00 EXECUTION

A. Installation of utility materials is specified in other sections of these technical specifications.

3.01 SHIPPING AND HANDLING

A. Handle pipe in a manner to ensure installation in sound, undamaged condition using proper equipment, tools and methods, as follows:

1. Suitable slings or skids.
2. Without hooks in contact with joint surfaces.
3. Provisions for preventing contact with adjacent units during moving or storage.
4. Protection for all pipe ends such as beveled ends, flanges, mechanical joints, plain ends, threads, etc., prior to shipping to job site.

3.02 PIPE INSPECTION

A. All pipe shall be subject to approval of the Engineer.

B. Pipe sections damaged by handling which, in the opinion of the Engineer, cannot be satisfactorily repaired shall be rejected. This shall include, but is not limited to, broken bells and spigots, bent bell-and-spigot rings, excessive deflection and similar damage.

3.03 CLEANING

A. Thoroughly clean interior of all pipe, fittings and joints before installation.

B. Exclude foreign matter during installation by providing temporary covers over end of pipe, if necessary.

C. Do not place tools, clothing or materials at any time in pipe.

D. Visually inspect, remove all articles in pipe, brush or flush clean immediately prior to final fitting of system.

3.04 VALVES AND ACCESSORIES

A. All valves and accessories for the piping systems shall be installed in accordance with the manufacturer's recommendations.

END OF SECTION 02080

DIVISION 2 - SITE CONSTRUCTION

SECTION 02230 - SITE CLEARING

1.00 GENERAL

1.01 DESCRIPTION OF WORK

A. The extent of this section shall cover all site clearing performed prior to or during any part of construction, and all final clearing necessary to insure proper drainage and prevent unsightly or unsafe conditions.

B. The work shall include, but not be limited to, the following:

1. Protection of existing trees designated to remain.
2. Clearing and grubbing.
3. Removal of existing fence.
4. Removal of all unsuitable material from public and private property resulting from construction operations.

C. Applicable sections: 02315 Excavating, Filling and Grading.

1.02 JOB CONDITIONS

A. Protection of Existing Improvements:

1. Extreme care shall be taken to protect all improvements on adjoining properties, and on public and private property. Damaged improvements shall be restored to their original condition, as acceptable to the parties having jurisdiction.
2. Precautionary measures shall be taken to prevent damage to existing improvements to remain in place on or near the new construction.

B. Protection of Existing Trees:

1. Existing trees indicated to remain in place shall be protected by temporary guards to avoid unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering resulting from stockpiling construction or excavation materials within the drip line, excess foot or vehicular traffic, and vehicular parking within the drip line. Trees damaged by construction operations shall be repaired by specialized personnel, in a manner acceptable to the Engineer. Trees which cannot be repaired and restored to full growth status, as determined by such specialized personnel, shall be replaced at the Contractor's expense.
2. Trees to remain within the limits of the contract work shall be properly cared for to maintain their health during the course of construction operations.
3. Cut roots faces over 1 1/2" in diameter shall be coated with an emulsified asphalt or other acceptable coating formulated for use on damaged plant tissues. Exposed roots shall be temporarily covered with wet burlap to prevent drying. Roots shall be covered with earth as soon as possible.

C. Salvageable Improvements: Items indicated to be salvaged shall be carefully removed and stored on the Owner's premises as directed by the Owner.

2.00 PRODUCTS

A. NOT APPLICABLE

3.00 EXECUTION

3.01 GENERAL

A. Improvements, vegetation, stumps, roots or obstructions interfering with the installation of new construction shall be removed and disposed of as specified in Section 02315 Excavating, Filling, and Grading.

B. Roots and branches of trees obstructing new construction shall be carefully and cleanly cut.

3.02 CLEARING AND GRUBBING

A. The site shall be cleared of trees, shrubs, and other vegetation interfering with construction, except where any of the above is to remain in place. Stumps, roots and other debris protruding through the ground surface shall be completely removed. Hand methods only shall be used for grubbing inside the drip line of trees remaining in place.

B. Depressions caused by clearing and grubbing operations shall be filled with satisfactory soil material unless further excavation or earthwork is scheduled.

C. When construction is on private easement, the width of clearing shall be field determined by the Owner, with the maximum width being the width of the easement.

3.03 DISPOSAL OF WASTE MATERIALS

A. Transport and dispose all trash, debris, trees, stumps, roots, ashes, cinders, or other refuse to areas off site.

B. Trees and other plant matter may be burned on-site. Notify the local "911" dispatch before any burning occurs.

END OF SECTION 02230

DIVISION 2: SITE CONSTRUCTION

SECTION 02280 - UTILITY RELOCATION AND ADJUSTMENTS

1.01 GENERAL

1.02 DESCRIPTION OF WORK

A. This work shall consist of locating all underground installations that are in the vicinity of the proposed construction such as water mains, water service lines, gas lines, telephone lines, sewer mains, sewer service laterals, electric lines, cable television cables and buried structures.

B. All utility facilities and appurtenances shall be relocated if it is determined that they will interfere or conflict with the proposed construction. Relocation shall be done by the utility owner, if applicable, or contractor at the Contractor's expense.

C. Any utilities damaged by the Contractor shall be repaired or replaced at the Contractor's expense.

1.03 ADJUSTMENTS

A. The Contractor shall make adjustments to all existing utilities such as valve boxes, clean outs, area drains, structures and other appurtenances so that they will match flush with the new finished grades.

2.00 PRODUCTS

2.01 MATERIALS DESCRIPTION

A. The materials used to relocate utilities and make adjustments shall be similar or better material than the existing located utility.

3.00 EXECUTION

3.01 GENERAL

A. The Contractor shall be responsible for and shall cooperate with the utility owner in the location and relocation of utility facilities.

B. The Contractor shall make every effort to minimize interruption of utility services to private or public facilities.

C. The relocation of water meters, water service lines, water mains and fire hydrants shall not commence until provisions for continued service have been made and approved by the local authority. The Contractor shall be responsible for coordination of these relocations.

D. The Contractor shall restore damaged utilities in a timely manor and as a priority item of work.

E. Any and all costs associated with utility relocation and adjustments shall be borne by the Contractor.

END OF SECTION 02280

DIVISION 2 – SITE CONSTRUCTION

SECTION 02315 - EXCAVATING, FILLING AND GRADING

1.00 GENERAL

1.01 DESCRIPTION OF WORK

A. This section includes, but is not limited to, the following:

1. Excavation
2. Trenching
3. Backfill, Compaction and Grading
4. All Related Items

B. All work shall be completed in accordance with the project plans and details.

C. Applicable sections: 02230 Site Clearing; 02374 Fertilizing, Seeding and Mulching; 03050 Portland Cement Concrete

1.02 QUALITY ASSURANCE

A. Applicable Standards:

1. American Society for Testing and Materials (ASTM).

1.03 JOB CONDITIONS

A. Subsurface Information: N/A

B. Existing Utilities:

1. Locate existing underground utilities in the areas of work before starting earthwork operations. Where utilities are to remain in place, provide adequate means of protection during earthwork operations.

2. Should uncharted, or incorrectly charted piping or other utilities be encountered during excavation, consult the utility owner immediately for directions. Cooperate with the owner and public and private utility companies in keeping their respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility owner.

3. Do not interrupt existing utilities servicing facilities occupied and used by the Owner or others, except when permitted in writing by the Engineer and only after acceptable temporary utility services have been provided. Completely remove from the site underground utilities indicated to be removed. Coordinate with local utility companies for shut-off services if lines are active.

C. Use of Explosives:

1. Blasting is not anticipated to be required during construction. If blasting is required, the Contractor shall not transport or use explosives on the site without notification and approval of the Owner and Engineer in writing. The Contractor shall comply with existing State and Federal laws regarding transporting, storing and handling explosive materials. The Contractor shall be solely responsible for the handling, storage and use of explosive materials, and of any damage which might be caused.

D. Temporary Protection:

1. Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction.

2. Protect structures, utilities, sidewalks, pavements and other facilities from damages caused by settlement, lateral movement, undermining, washout and other hazards created by excavation operations.

3. Temporary covering or enclosures and temporary heat shall be provided as necessary to protect bottoms of excavations from freezing and frost action when the atmospheric temperature is less than 35 degrees F. Work shall not be installed on frozen excavation bases or subbases.

E. Temporary Erosion Control:

1. The Contractor shall be responsible for keeping surface water runoff free from silt, sediment and earthfill material in areas disturbed by all construction activities.

F. Private Easements:

1. Where excavation occurs on private easement, stockpile topsoil and replace after construction on disturbed areas.

G. Rock Excavation:

1. No additional or separate payment will be made for Rock Excavation.

2.00 PRODUCTS

2.01 MATERIALS DESCRIPTION

A. Cohesionless materials shall include gravels, gravel-sand mixtures, sands, and gravelly sands exclusive of clayey and silty material, materials which are free-draining and for which impact compaction will not produce a well-defined moisture-density relationship curve and for which the maximum density by impact methods will generally be less than by vibratory methods.

B. Cohesive materials shall include silts and clays generally exclusive of sands and gravel--materials for which impact compaction will produce a well-defined moisture-density relationship curve.

C. Impervious cohesive materials shall be defined as CH or CL materials as defined by the Unified Soil Classification System.

D. Permeable materials shall be defined as either non-cohesive or cohesive materials that do not meet the specifications for impervious cohesive materials.

E. Waste:

1. Waste materials include excess suitable materials and all materials unsuitable for use in the work.

a) Unsuitable materials include all materials that contain debris, roots, organic matter, frozen matter, rock (with any dimension greater than one-half the loose layer thickness) or other materials that are determined by Engineer as too wet or otherwise unsuitable for providing a stable subgrade or stable foundation for structures.

b) Suitable materials include materials that are free of debris, roots, organic matter, refuse, ashes, cinders, frozen matter and that which is free of rock with any dimension greater than one-half of the specified loose layer thickness.

2. All waste materials (excess suitable and all unsuitable) encountered during trenching shall be removed from the immediate work area and disposed of, as directed by the Engineer.

F. Rock Excavation:

1. No additional or separate payment will be made for rock excavation.

G. Borrow:

1. Borrow materials include all fill materials and topsoil obtained from approved locations.

2. Borrow shall include all excavating, handling, and final disposal of materials as specified.

   a) If a separate bid item is not included for borrow, all cost associated with borrow shall be included in earthwork.

3. Proper methods of erosion and sediment control of the borrow site shall also be the Contractor's responsibility.

H. Backfill:

1. Backfill materials shall include satisfactory soil materials from excavations and borrow areas.

2. Materials shall not contain gravel, stones, or shale particles.

3. Backfill shall be free of roots or other organic matter, refuse, ashes, cinders, frozen earth or other deleterious matter.

I. Topsoil:

1. Topsoil shall be a friable clay loam surface soil having a minimum depth of 4" and relatively free of subsoil, clay lumps, stones, and other objects over 2" in diameter, and without weeds, roots and other objectionable material.

2. Topsoil shall be stripped to appropriate depths to prevent intermingling with the underlying subsoil or other objectionable material. Heavy growths of grass shall be removed from construction areas prior to stripping.

3. Topsoil stripping shall be stopped a sufficient distance from trees to be left in place to prevent damage to the main root system.

4. Topsoil shall be stockpiled in designated areas or as otherwise directed. Piles shall be constructed to freely drain surface water.

J. Granular Base Materials:

1. Material shall be crushed stone with the following gradation:

Sieve Size	Percent Passing
Passing 1-inch sieve	100
Passing ½-inch sieve	60-90
Passing No. 4 sieve	40-60
Passing No. 30 sieve	15-35
Passing No. 200 sieve	0-15

2. Material shall not have loss of more than 15% after 5 cycles when tested for soundness with sodium sulfate as described in ASTM C88.

3. Material shall have a percentage of wear not to exceed 50% as determined by ASTM C131.

4. Material shall be used in locations as shown on the Plans.

K. Bedding:

1. Bedding shall be in accordance with ASTM D2321 using Class I, II, or III material:

   a) Class I: Minimum 6" uniform bedding. If Class I bedding is used, then Class I material must also be utilized for haunching up to the spring line of the pipe.

   b) Class II: Minimum 6" compacted to 85 Percent Standard Proctor Density.

   c) Class III: Minimum 6" compacted to 90 percent Standard Proctor Density.

2. Granular bedding shall be prepared as follows:

   a) Bedding shall be in accordance with the typical details as shown on the drawings.

   b) Trenches shall be of necessary depths to accept bedding material to conform to proper grades as shown on the drawings.

   c) Placement of bedding material shall be carefully made so that when pipe is placed in position, it is true to line and grade.

L. Haunching and Initial Backfill: Haunching and initial backfill shall be in accordance with ASTM D2321 using Class I, II, or III material.

1. Class I: As specified in ASTM D2321 to a point at least 12" over the top of the pipe.

2. Class II: Initial backfill shall be compacted to a point at least 12" over the top of the pipe.

3. Class III: Initial backfill shall be compacted to a point at least 12" over the top of the pipe.

M. Granular Non-Trench Backfill Materials:

1. The fine aggregate shall consist of clean sand, stone sand, stone screenings, chats, wet bottom boiler slag or slag sand.

2. The fine aggregate shall be clean and reasonably free from an excess of soft or unsound particles and other objectionable matter.

3. The gradation shall be as follows:

Sieve Size	Percent Passing
3/8"	100
No. 4	92-100
No. 100	0- 40
No. 200	0- 10

N. Granular Trench Backfill:

1. The material shall be crushed stone with the following gradation:

Sieve Size	Percent Passing
1"	100
1/2"	60-90
No.	40-60
No. 40	15-35

2. The aggregate shall be essentially limestone or dolomite. It shall not contain more than 15% deleterious rock and shale.

2.02 SOIL CLASSIFICATIONS

A. Satisfactory soil materials shall be nonswelling materials with plastic indexes of less than 20 and liquid limits less than 40. Soil meeting these requirements under the Unified Soil Classification System for the following soil groups are acceptable:

1.

Classification	Description
GW.	Well graded gravels, gravel-sand mixtures, little or no fines.
GP.	Poorly graded gravels, gravel-sand mixtures, little or no fines.
GM.	Silty gravels, poorly graded gravel-sand-silt mixtures.
SW.	Well graded sands, gravelly sand, little or no fines.

2.

Classification	Description
SP.	Poorly graded sands, gravelly sands, little or no fines.
SM.	Silty sands, poorly graded sand-silt mixture.
SC.	Silty sands, sand-clay mixtures.
ML.	Inorganic silts, and very fine sands with slight plasticity.
CL.	Silty or sandy clays of low plasticity.

B. Unsatisfactory soil materials consist of all other materials including the following that are classified under the Unified Soil Classification System:

1.

Classification	Description
OL. . . .	Organic silts and organic silty clays of low plasticity.
MH.	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
CH.	Inorganic clays of high plasticity, fat clays.
OH.	Inorganic clays of medium to high plasticity, organic silts.
PT.	Peat and other highly organic soils.

2.03 SOIL CATEGORIES

A. Embedment soils used in pipe installation are described by ASTM and are grouped into five categories below:

1. Class I - Angular, 6 to 40 mm (1/4" to 1 1/2") graded stone, including materials such as coral, slag, cinders, crushed stone, and crushed shells.

2. Class II - Coarse sands and gravels with maximum particle size of 40 mm (1 1/2") including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil types GW, GP, SW and SP are included in this class.

3. Class III - Fine sand and clayey gravels, including fine sands, sand-clay mixtures, and gravel-clay mixtures. Soil types GM, GC, SM, and SC are included in this class.

4. Class IV - Silt, silty clays, and clays, including inorganic clays and silts of medium to high plasticity and liquid limits. Soil types MH, ML, CH, and CL are included in this class. These materials are not recommended for bedding, haunching, or initial backfill.

5. Class V - This class includes the organic soils, OL, OH, and PT as well as soils containing frozen earth, debris, rocks larger than 40 mm (1 1/2" in diameter), and other foreign materials. These materials are not recommended for bedding, haunching, or initial backfill.

3.00 EXECUTION

3.01 EXCAVATION

A. Earth excavation includes the removal and disposal of pavements and other obstructions visible on the ground surface, underground structures and utilities indicated to be replaced and removed, material of any classification indicated in data on subsurface conditions and all other materials encountered that are not classified as rock excavation or unauthorized excavation.

B. Rock excavation consists of the removal and disposal of materials encountered that cannot be excavated with a 3/4 cubic yard capacity power shovel without drilling and blasting, or continuous use of a ripper or other special equipment, except such materials that are classified as earth excavations.

1. Typical of materials classified as rock are boulders 1/2 cubic yard or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits.

2. Intermittent drilling that may be performed to increase production and is not necessary to permit excavation of the material encountered will be classified as earth excavation.

C. Unauthorized excavation consists of removal of materials beyond indicated elevations without the specific direction of the Engineer. Unauthorized excavation shall be replaced by backfilling and compacting as specified for authorized excavations of the same classification, unless otherwise directed by the Engineer.

D. Additional excavation consists of carrying excavations deeper and replacing the excavated material as directed by the Engineer if unsuitable materials are encountered at the required subgrade elevations. When excavation has reached required subgrade elevations, the Contractor shall notify the Engineer, who will make an inspection of conditions.

E. Excavation for Trenches:

1. Trenches shall be excavated to lines and grades necessary to accept the pipes shown on the plans or as established by the Engineer.

2. Trenching in all instances shall be kept to minimum widths to a point 12" above top of pipe. Remaining trench to be kept to minimum width as near as possible. Contractor is to use sheeting or an approved method to insure voidance of excessive widths. Trenching under existing utilities shall be by hand method and utility supported by approved methods.

3. Trenches in rock shall be excavated to minimum widths as specified. All rock and shale excavation not suitable for backfill materials shall be removed from the site and disposed of at the expense of the Contractor. All work in connection with blasting operations, including necessary and proper safety precautions, shall be performed under expert supervision and in compliance with all laws, ordinances, and applicable safety code requirements and regulations. The Contractor shall in no way hold the Owner or Engineer responsible for any damage or suits caused by his blasting operation.

4. If overdigging occurs, all loosened earth must be removed and brought back to grade with approved granular base material, compacted to 95% density per ASTM D698, without additional cost to the Owner.

5. Any material below the specified plan grade which is not, or cannot be made stable by drainage or compaction, in the opinion of the Engineer or his representative, shall be removed and replaced with an approved select granular material. This granular material stabilization shall be considered incidental and shall be included in price bid for other items.

6. Mechanical excavation of the trench shall be to 4" below the bottom of the pipe. The trench bottom shall be dry when excavated, then filled with granular bedding material to place the pipe at the planned grade. The granular material shall be prepared to receive the pipe barrel and bell holes (if the pipe has bells) shall be excavated to relieve the bell from bearing.

7. Tunneling operations shall be done only where such is required by the plans, provided that the adjacent trench depth and soil conditions are adequate and suitable for such construction. All bracing, shoring, sheeting, pipe placement, and backfill shall be the responsibility of the Contractor to be performed in compliance with OSHA regulations.

8. Foundations: Native soils in the foundation should be firm and stable to provide support for the construction operations and eventual overburden loads.

   a) Unstable Trench Bottom: Where unstable foundations exist, replace them with over-excavation (see 8.b.) or wood piling, steel piping or sheeting all capped with concrete, steel, or wood. When using piling or sheeting, place 4"-6" of Class I, II and/or III soil bedding as described above over the special foundation cap. Do not use cinders in these foundation conditions, as they tend to become unstable when wet.

   b) Over-Excavation: If the trench depth is cut more than 6" below the pipe invert into the foundation zone, replace this over-excavation with Class I, II, or III soils. Class III soils shall be densified in 6" lifts. When the trench is wet and unstable, do not over-densify, as this may create a more unstable condition (such as pumping).

   c) Rock, Hardpan, etc. Excavation: When the trenching is to be cut in hardpan, rock, or other similar native soil, remove that soil a sufficient depth to provide 4"-6" of bedding as described in Section 2.01, K. Bedding.

9. All open trenches and other excavations shall be provided with suitable barriers, signs, and lights to the extent that adequate protection is provided to the public. Obstructions, such as material piles and equipment, shall be provided with similar warning signs and lights. All barricades and obstructions shall be illuminated by means of warning lights at night. All lights used for this purpose shall be kept burning from sunset to sunrise. Materials stored upon or alongside public streets and highways shall be so placed, and the work at all times shall be so conducted, so as to cause the minimum obstruction and inconvenience to the traveling public. All barricades and light expense will be paid by the Contractor.

10. Trenches with Sloping Sides-Limited:

   a) The Contractor may, at his option, where working conditions permit (as determined by the Engineer), excavate pipeline trenches with sloping sides, but with the following limitations:

      (i) In general, only braced and vertical trenches will be permitted in traveled streets and alleys.

      (ii) Where trenches with sloping sides are permitted, the slopes shall not extend below the top of the pipe, and trench excavations below this point shall be made with vertical sides with widths not exceeding those specified hereinbefore, and shown on the drawings, of the various sizes of pipe.

11. A minimum of 4" Class I Bedding shall be placed under all manholes, junction boxes, drop inlets and catch basins.

3.02 SHORING AND BRACING

A. Slope the sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible either because of space restrictions or stability of material excavated.

B. Except where banks are cut back on a stable slope, excavation for structures and trenches shall be properly and substantially sheeted, braced and shored as necessary to prevent caving or sliding to provide protection for the workmen and the work, and to provide protection for existing structures and facilities. Sheeting, bracing and shoring shall be designed and built to withstand all loads that might be caused by earth movement or

pressure, and shall be rigid, maintaining its shape and position under all circumstances, per OSHA requirements.

C. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

D. Provide shoring and bracing to comply with local codes and authorities having jurisdiction.

E. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.

F. Maintain shoring and bracing in excavations regardless of the time period excavations will be open. Carry down shoring and bracing as the excavation progresses.

3.03 DEWATERING

A. Prevent surface water and subsurface or groundwater from flowing into excavations and flooding the project site and surrounding area.

B. Do not allow water to accumulate in excavations. Remove water from excavations to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to the stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey the water away from the site.

C. Convey water removed from excavations and rainwater to collector run-off areas. Do not use trench excavations for site utilities as temporary drainage ditches.

D. Provide an adequate system to lower and control the groundwater in order to permit excavation, construction of structures and the placement of fill materials to be performed under dry conditions. Install sufficient dewatering equipment to pre-drain the waterbearing strata above and below the bottom of structure foundations, drains, sewers, and other excavations.

E. Reduce the hydrostatic head in the waterbearing strata below structure foundations, drains, sewers, and other excavations to the extent that the water level and piezometric water levels in the construction areas are below the prevailing excavation surface at all times.

F. Maintain piezometric water level a minimum of 1' below the excavation surface.

G. Prior to excavation below groundwater level, place the dewatering system into operation to lower the water levels as required and then operate it continuously 24 hours a day, 7 days a week until drains, sewers and structures have been constructed, including placement of fill materials, and dewatering is no longer required.

H. Dispose of water removed from excavations in such a manner so as to not endanger public health, property, and portions of the work under construction or completed. Dispose of water in such a manner that will cause no inconvenience to others engaged in work about the site. Provide sumps, sedimentation tanks, and other flow control devices as required by governing authorities.

I. Provide complete standby equipment, installed and available, for immediate operation as may be required, to adequately maintain dewatering on a continuous basis in the event that any part of the system becomes inadequate or fails. In the event dewatering requirements are not satisfied due to inadequacy or failure of the dewatering system, perform such work as may be required to restore damaged structures and foundation soils at no additional expense.

3.04 MATERIAL STORAGE

A. Stockpile excavated materials classified as satisfactory soil material where directed until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.

B. Locate and retain fill materials away from edges of excavations.

C. Dispose of excess soil material and waste materials as herein specified, and as acceptable to the Owner.

3.05 MOISTURE CONTROL

A. Where the subgrade layer of soil material must be moisture conditioned before compaction, uniformly apply water to the surface of subgrade, or layer of soil material to prevent free water from appearing on the surface during or subsequent to compaction operations.

B. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

1. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing, until the moisture content is reduced to a satisfactory value.

3.06 BACKFILLING STRUCTURES

A. Ground Surface Preparation:

1. Remove vegetation, debris, unsatisfactory soil materials, obstructions and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

2. When the existing ground surface has a density less than that specified under "Compaction" for the particular area classification, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to the required depth and percentage of maximum density.

B. Backfilling shall not be performed until:

1. Construction has been completed below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.

2. Underground utility locations have been recorded, inspection and testing have been performed and approval has been granted.

3. Concrete formwork has been removed.

4. Shoring and bracing have been removed and voids have been filled with satisfactory materials. Temporary sheet piling driven below the bottom of structures shall be cut off and removed in a manner that will prevent settlement of the structure or utilities or left in place, if required.

5. Trash and debris have been removed.

6. Permanent or temporary horizontal bracing is in place.

7. Concrete has attained its design strength, but no sooner than seven (7) days after it was placed.

8. A sufficient portion of the structure has been built to resist the imposed load.

C. Perform backfilling simultaneously on all sides of the structures.

D. Exercise extreme care in the use of heavy equipment in backfill areas.

E. Placement and Compaction:

1. Granular Backfill/Base:

a) General: Granular base material shall be placed in the areas and to the cross-sections and thickness as indicated on the plans.

b) Place granular base material on prepared subgrade in layers not to exceed 6"compacted depth.

c) Maintain optimum moisture content for compacting material during placement operations.

d) The material shall be compacted by rolling or mechanical tampers.

e) Base material shall be compacted to 95% conforming to ASTM D698, whichever is applicable.

f) Thickness and grade tolerances shall be plus or minus 0.10'.

2. Minimum Density Requirements: Compact soil to not less than the following percentages of maximum dry density for soils which exhibit a well-defined moisture density relationship determined in accordance with ASTM D698; and not less than the following percentages of relative density determined in accordance with ASTM D2049, for soils which will not exhibit a well-defined moisture density relationship.

a) Structures: Compact top 12" of subgrade and each layer of backfill or fill material at 95% maximum dry density.

b) Pavements: Compact top 6" of subgrade and each layer of backfill or fill material at 95% maximum dry density per ASTM D-698.

c) Unpaved Areas: Compact each layer of backfill at 90% dry density.

3.07 BACKFILLING TRENCHES

A. All trenches and excavations shall be backfilled immediately after pipe is laid therein, unless other protection of the pipeline is directed. Under no circumstances, however, shall water be permitted to rise in unbackfilled trenches after pipe has been placed or during the laying of pipe. Material used for backfill shall not contain stones 3" or greater in size, frozen earth, debris, or earth with an exceptionally high void content. Class II haunching and initial backfill material shall be only approved granular material used and placed in uniform layers not exceeding 6" in depth up each side. Each layer shall be placed, then carefully and uniformly tamped so as to eliminate the possibility of later displacement. Any excess backfill material shall be removed from the job site. Where unsuitable backfill material is encountered, the Contractor shall, at his own expense, provide and place acceptable backfill material. All sod in lawns and parking lots, surfaces damaged by trenching operations, shall be replaced or re-seeded as directed by the Engineer.

B. Puddling or water flooding for consolidation backfill material shall be subject to approval of the Engineer. In general, the addition of water should be limited to achieving optimum moisture content for tamping procedures.

C. Whenever trenches or other excavations made by the Contractor in the performance of work under this Contract have not been properly filled, or where settlement has occurred at any time prior to the final acceptance of the entire work covered by the contract, to the extent that the top of the backfill is below the original ground surface, such trenches shall be refilled and the backfill surface compacted and smoothed to conform to the elevations of the adjacent ground surface. The Contractor shall be responsible for all damage which might occur as a result of the settlement of trench or other backfill made by him in the fulfillment of his contract within and during a period of one year from and after the date of final acceptance of entire project thereof by the Owner, including (a) the cost to the Owner of all claims for damages filed with and court action brought against the said Owner for and on account such damage, and (b) the repair to the satisfaction of the Owner of any and each pavement, driveway, curb, slab, walk, lawn, or structure damages by such backfill settlement.

D. Full depth granular trench backfill shall be placed above the initial backfill and extending up to existing grade. It is the intent to backfill all street and driveway crossings and areas where new utility lines will be under the street roadbed with granular trench backfill. The cost of these aggregates and their installation shall be

incidental to the cost per lineal feet of utility pipe, unless a separate item is set out in the proposal. The granular trench backfill shall consist of a Class I type material compacted to 95% standard proctor density in accordance with ASTM D-698. The aggregate shall be uniformly graded.

3.08 GRADING

A. Grading shall involve the bulk cutting, moving, redistribution, compaction and shaping of soil wherein there results a change in the topography of the site. Areas upon which fills are to be placed shall be scarified prior to placement of any fill material. All fill required for the construction shall be of material not containing stones larger than six inches in diameter, or frozen earth shall be free from stocks, large roots, or other organic matter coarser than grass roots, and shall have a moisture content such that optimum compaction is obtained when properly tamped or rolled. All fill shall be placed in layers of not more than 8 inches in uncompacted thickness and compacted to a density equal to or greater than 95% of maximum laboratory dry density as determined by ASTM D-698. No frozen material shall be placed nor shall any fill material be placed upon or against frozen surfaces. Compaction efforts will be determined by random testing of the material with no less than one (1) test per acre per lift. The Contractor shall not proceed with additional lifts until the Engineer has approved the previous lift of fill. The Contractor shall provide an Engineer approved testing services to determine proper compaction of fills at no additional cost to the Owner.

B. The fill areas shall be compacted by a minimum of two passes of tamping with a sheeps-foot roller over the surface of each layer. Fills shall be compacted to a density equal to or greater than 95% of maximum laboratory dry density as determined by ASTM D 698.

C. General:

1. Uniformly grade areas within the limits of site grading including adjacent transition areas. Smooth finished surfaces within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

2. The degree of finish required will be that ordinarily obtainable from either blade-grader or scraper operations.

D. Ditches:

1. Finish ditches to ensure proper flow and drainage. Conduct final rolling operations to produce a hard, uniform and smooth cross-section.

E. Unpaved Areas:

1. Finish areas to receive topsoil to within not more than 0.10' above or below the required subgrade elevations, compacted as specified, and free from irregular surface changes.

3.09 PAVEMENT REMOVAL AND REPLACEMENT

A. Where surfaced streets, walks, drives, or parking areas are cut, removed, or damaged in the completion of the work, the Contractor shall replace all pavements or other surfacing material removed or damaged to their original, or better state and condition.

B. After trench backfill with granular material, the Contractor shall maintain the surface at pavement grade until the permanent pavement is replaced.

C. Pavements constructed of asphalt or concrete shall be removed in a careful manner and so that not less than 6" in width at any point is left between the cut edge of the pavement and the top of the trench. All asphalt or blacktop pavement, removed or damaged shall be replaced with four (4) inches of asphalt concrete. Asphalt concrete shall comply with minimum requirements for Type "SP-125" mixes as specified in the most current edition of the Illinois Department of Transportation's Standard Specifications for Road and Bridge construction.

D. All concrete pavements and sidewalks, removed or damaged, shall be replaced with an equal thickness concrete slab of Class A concrete reinforced with 0.25% steel.

E. Gravel surfaced streets shall require no repaving other than the gravel surface of trench backfill or a 12" surface layer of better material if such is normally used by the authority maintaining the road. A trench in a graveled street will be considered as having been repaved when the graveled surface has become stable and is at proper grade.

3.10 TOPSOIL PLACEMENT

A. Topsoil shall not be placed until the area to be covered has been shaped, trimmed and finished to subgrade elevations in accordance with earthwork and site grading specifications.

B. All irregularities or depressions in the surface due to weathering or other causes shall be filled and smoothed out before the topsoil is placed.

C. If the existing surface has become hardened or crusted or if directed by the Engineer, it shall be disked, raked, or by other approved means scarified to a depth of at least 2" so as to provide a bond with the layer of topsoil to be placed.

D. Topsoil shall be distributed over areas requiring placement to a minimum compacted depth of 4".

E. The surface of the topsoil shall be free from clods and debris and shall conform to the lines, grades and minimum thickness as described. The finish grading shall be done so as to prevent irregularities and depressions in which water will be retained. One rolling of the entire surface will be made.

F. Surplus topsoil shall be distributed over the entire area. Distribution shall be in a manner conforming to cross-sections and not hindering drainage.

3.11 FIELD QUALITY CONTROL

A. The testing service, provided by the Contractor, will inspect and approve subgrades and fill layers before additional construction work is performed.

B. Field density tests will be performed in accordance with ASTM C 1556 (sand cone method), ASTM D 2167 (rubber balloon test), ASTM D 2922-91 (density of soil and soil-aggregates in-place by Nuclear Methods) or ASTM D 3017 (water content of soil and rock in-place by Nuclear Methods).

C. If, in the opinion of the Engineer, based on testing service reports and inspection, the subgrade or fills which have been placed are below the specified density, additional compaction and testing will be required at no additional expense to the Owner.

3.12 MAINTENANCE

A. Protection of Graded Areas:

1. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

2. Repair and re-establish grades in settled, eroded and rutted areas to the specified tolerances.

3. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, re-shape and compact to the required density prior to further construction. Use hand tamping for recompaction over underground utilities.

3.13 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Transport all trash and debris or other refuse to an approved disposal area. Excess excavated material shall be placed at locations approved by the Owner.

B. Trees, stumps, and roots may be burned on-site. See Site Clearing, Section 02230, 3.03 B & C for preparation and permitting.

C. The disposal of waste and excess excavated materials, including hauling, handling, leveling and surfacing, shall be a subsidiary obligation of the Contractor and no separate payment will be made therefore.

3.14 SEEDING AND SODDING

A. Seeding and sodding shall be completed in accordance with Fertilizing, Seeding, and Mulching in Division 2, Section 02374.

END OF SECTION 02315

DIVISION 2 - SITE CONSTRUCTION

SECTION 02316 - P.C.C. FLOWABLE FILL

1.00 GENERAL

A. The Contractor shall furnish all labor, materials, and equipment required to complete the installation of the P.C.C. Flowable Fill work as shown on the drawings and as specified herein.

1.01 QUALITY CONTROL

A. Inspection and testing will be performed by a testing firm approved by the Engineer and paid for by the Contractor.

B. Compressive strength shall be the preferred method of testing for acceptance and quality control. Compressive strength testing shall be governed by the guidelines set forth in A.C.I. Committee Report 229R-94.

1.02 SUBMITTALS

A. Prior to beginning any work and within fourteen (14) days following the notice to proceed, the Contractor shall submit to the Engineer, for review, previous laboratory generated data detailing performance of the proposed mix design. If laboratory data is not available, the proposed mix design shall be checked by a laboratory approved by the Engineer. All costs related to such testing shall be paid for by the Contractor, each mix design shall include the following information:

1. Water/Cement Ratio
2. Type of Cement
3. Per cubic yard weights for cement, coal fly ash, and foundry sand.
4. Compressive strength at 7 and 28 days.

1.03 A.S.T.M. REFERENCES

1.04 ASTM Specification Number	1.05 Title
D 4832-95el	Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders
D 5239-92	Standard Practice for Characterizing Fly Ash for Use in Soil Stabilization
D 5971-96	Standard Practice for Sampling Freshly Mixed Controlled Low Strength Material
D 6103-07	Standard Test Method for Flow Consistency of Controlled Low Strength Material
D 6023-96	Standard Test Method for Unit Weight, Yield, Cement Content and Air Content (Gravimetric) of Controlled Lowe Strength Material (CLSM)
D 5971-96	Standard Practice for Sampling Freshly Mixed Controlled Low Strength Material
D 6024-96	Standard Test Method for Ball Drop on Controlled Low Strength material (CLSM) to Determine Suitability for Load Application

2.00 PRODUCTS

2.01 PORTLAND CEMENT

A. The Portland cement shall conform to A.S.T.M. Specifications C-150, Type 1.

2.02 FINE AGGREGATE

A. The fine aggregate shall consist of clean, natural sand of hard, strong, durable material, free from foreign organic material or other injurious impurities conforming to A.S.T.M. C-33.

B. The sand shall be graded to the following sieve percentages by weight:

SIEVE SIZE	PERCENT PASSING
3/8 Inch	100
No. 4	95-100
No. 16	60-75
No. 50	10-35
No. 100	0-5

2.03 FLY ASH

A. The fly ash shall be coal fly ash as defined by the American Coal Ash Association.

2.04 WATER

A. The water in mixing P.C.C. Flowable Fill shall be clean and free from injurious amounts of oil, acids, alkalis, salts, or organic material. The water used shall be of potable quality.

3.00 EXECUTION

3.01 P.C.C. FLOWABLE FILL

A. Provide P.C.C. Flowable Fill with 200-psi 28 day strength, and sufficiently fluid to fill all voids in the excavation, and obtain total compaction.

B. Flowable fill shall be protected from freezing for a minimum 24 hours after placement.

C. When flowable fill is used around objects subject to floating; i.e. pipes, conduits, tanks pools etc., the Contractor shall take appropriate measures to prevent floatation or misalignment.

D. All flowable fill shall be batched from a ready mix central plant, and delivered to the job site via two speed mixer trucks. Flowable fill which does not meet the performance standards herein, may be rejected by the Engineer and returned to the central batch plant.

E. One sample shall be made for testing strength for every 20 cubic yards of flowable fill used on the project.

END OF SECTION 02316

DIVISION 2 - SITE CONSTRUCTION

SECTION 02343 – GEOTEXTILE SEPARATION FABRIC

1.00 GENERAL

1.01 DESCRIPTION OF WORK

A. Separation fabric for gravel paved and/or rock blanket and paved areas.

1. This work shall consist of furnishing and placing a geotextile for use as a permeable separator to prevent inter-mixing of dissimilar materials such as subgrades and surfaced or unsurfaced pavement materials; and foundations and selected fill materials. The geotextile shall be designed to allow passage of water while retaining in-situ soil.

1.02 QUALITY ASSURANCE

A. The average roll minimum value (weakest principle direction) for strength properties of any individual roll tested from the manufacturing lot or lots of a particular shipment shall be in excess of the average roll minimum value (weakest principal direction) as specified in the materials section.

B. A competent laboratory must be maintained by the producer of the fabric at the point of manufacture to insure quality control in accordance with ASTM testing procedures.

1.03 SUBMITTALS

A. The fabric producer's laboratory shall maintain records of its quality control results and the contractor shall provide, upon request of the Engineer prior to shipment, manufacturer's certificate. The certificate shall include:

1. Name of manufacturer.
2. Chemical composition.
3. Product description.
4. Statement of compliance to specification requirements.
5. Signature of legally authorized official attesting to the information requested.

1.04 DELIVERY, STORAGE AND HANDLING

A. Geotextile Shipment/Storage: the geotextile rolls shall be furnished with suitable wrapping for protection against moisture and extended ultraviolet exposure prior to placement. Rolls shall be stored in a manner that protects them from the elements. If stored outdoors, they shall be elevated and protected with a waterproof cover. At no time shall the geotextile be exposed to ultraviolet light for a period exceeding 14 days. The geotextile rolls shall be labeled as per ASTM D4873, "Guide for Identification, Storage and Handling of Geotextiles".

B. The engineering fabric shall be provided in rolls wrapped with protective covering to protect the fabric from mud, dirt, dust, and debris.

C. The fabric shall be free of defects or flaws which significantly affect its physical properties.

D. Each roll of fabric in the shipment shall be labeled with a number or symbol to identify that production run.

2.00 PRODUCTS

2.01 MATERIALS

A. The geotextile shall be composed of synthetic fibers formed into a woven or nonwoven fabric. Fibers used in the manufacture of the geotextile shall be composed of at least 85 percent by weight polyolefins, polyesters, or polyamides. The geotextile shall be free of defects or flaws which significantly affect its physical properties. The geotextile shall meet the requirements of ***Table 5.1***. The choice of a geotextile

for this application is determined by the ability of the geotextile to survive installation stresses as shown in ***Table 5.2.***

B. Separation fabric for gravel paved areas:

1. The geotextile separation fabric material shall be Propex Geotex 315ST, Carthage Mills FX-66, or equal woven geotextile fabric

   a) Grab tensile strength (ASTM 4632) shall be 315 pounds minimum.
   b) Elongation at failure (ASTM 4632 shall be 15%.
   c) Burst strength (ASTM D3786) shall be 675 pounds per square inch minimum.
   d) Puncture strength (ASTM D4833) shall be 150 pounds per square inch minimum.
   e) Trapezoid tear (ASTM D4533) shall be 120 pounds per square inch minimum.
   f) Ultraviolet resistance (ASTM D4355) stability shall be 70/150 percent minimum of the grab tensile strength after fadometer exposure of 300 hours.

C. Reference Paragraphs 1.33, A-F in Section 01110 Summary of Work regarding "equal" products and substitutions.

D. Site Preparation: The installation area shall be prepared by clearing all debris or obstructions which may damage the geotextile. Trees and large bushes should be cut at ground level. In most cases, all native vegetation, roots and topsoil must be removed from the roadway subgrade prior to geotextile placement. Where required by the contract documents, soft and otherwise unsuitable subgrade areas shall be identified, excavated, and backfilled with selected material in accordance with the contract documents. Stabilization of these areas may be enhanced by use of a geotextile at the bottom of the excavation before backfilling. However, when designed for soft or wet subgrade conditions, native vegetation, roots, and topsoil may be left in place so as to limit disturbance and resulting shear strength loss of the subgrade soil.

E. Geotextile Placement: The geotextile shall be unrolled as smoothly as possible on the prepared subgrade in the direction of construction traffic. Geotextile rolls shall be overlapped in the direction of subbase placement. The geotextile shall be overlapped or seamed in accordance with the minimum requirements provided in ***Table 5-3***. Sewing is recommended where subgrade soils exhibit a CBR less than 0.5 and is preferred where subgrade soils exhibit greater that 0.5 but less than or equal to 1.

1. If required, the geotextile may be held in place prior to subbase placement with pins, sand bags, or piles of fill or rock. On curves, the geotextile may be folded or cut to conform to the curve as illustrated in ***Figure 5-1***. If site conditions require geotextile seaming, the geotextile shall be cut and seamed on the curve. The fold or overlap shall be in the direction of construction and shall be held in place as prescribed above. The geotextile shall not be dragged across the subgrade.

2. Damaged geotextiles, as identified by the Engineer, shall be repaired immediately. The damaged area plus an additional 3 ft. around the damaged area shall be cleared of all fill material. A geotextile patch extending 3 ft. beyond the perimeter of the damage shall be constructed as directed by the Engineer. Sewing of a geotextile patch may be required over soft subgrades as directed by the Engineer. Damaged geotextiles shall be repaired at no cost to the Owner.

F. Aggregate Placement: The aggregate base or subbase (aggregate) shall be placed by end dumping adjacent to the geotextile or over previously placed aggregate. End dumping or tail gate dumping of aggregate on the geotextile will not be permitted. The aggregate shall be spread from the backdumped pile using a bulldozer. A sufficient thickness of aggregate should be in place prior to dumping to minimize the potential of subgrade pumping and localized subgrade failure.

1. The aggregate shall be placed on the geotextile in lifts no less that 6 inches thick. For low volume roads, the minimum lift may be reduced to a 4 inch thickness at the discretion of the Engineer. Traffic shall not be permitted directly on the geotextile. Sudden stops or turns by equipment operating on aggregate placed over the geotextile shall be avoided. A smooth drum roller shall be used to achieve specified aggregate density. Any ruts occurring during construction shall be filled with additional aggregate and compacted to the specified density. Vibratory compacting shall not be used on the initial lift over the geotextile.

3.00 EXECUTION

3.01 PERFORMANCE

A. Inspection:

1. The contractor shall use mechanical laydown equipment as supplied by the supplier and place the fabric in accordance with manufacturer's specifications. The placement of the fabric shall be in such a manner that the fabric will be laid down without wrinkles and folds or both.

2. The contractor shall be responsible for providing notification to allow sufficient time for inspection.

3. Under no circumstances will work be accepted without the inspections being performed by the Engineer.

3.02

TABLE 5-1

PHYSICAL REQUIREMENTS [1, 2, 3]

GEOTEXTILES IN SEPARATION APPLICATIONS

Property	Units	Required Values		Test Method
		Medium Survivability [4]	High Survivability [4]	
Tensile Strength	lbs	180	270	ASTM D 4632
Elongation	%	50	50	ASTM D 4632
Seam Strength	lbs	160	240	ASTM D 4632
Puncture Strength	lbs	70	100	ASTM D 4833
Trapezoid Tear Strength	lbs	70	100	ASTM D 4533
Permittivity	1/sec	.02(5)	.02(5)	ASTM D 4491
Apparent Opening Size	U.S. Standard Sieve	(6)	(6)	ASTM D 4751
Ultraviolet Stability [7]	%	70	70	ASTM D 4355

Notes:

1. Conformance of geotextiles to specification property requirements shall be determined according to ASTM D 4759, "Practice for Determining the Specification Conformance of Geosynthetics."

2. Contracting agency may require a letter from the manufacturer certifying the geotextiles meet specification requirements.

3. All numerical values, except those of elongation, represent minimum average roll values (i.e., average test results from any sampled roll in a lot shall meet or exceed the minimum average roll values) in weaker principal direction. Values of elongation represent maximum average roll values. Lot sampled according to ASTM D 4354, "Practice for Sampling Geosynthetics for Testing".

4. Recommended survivability ratings are provided in ***Table 5-2.***

5. Permittivity shall be greater than the specified minimum value and result in a geotextile permeability which is greater than the permeability of the subgrade soil.

6. Minimum #30 U.S. Standard Sieve (maximum 0.6mm) for subgrade soils with 50 percent or greater particles by weight passing the #200 U.S. Standard Sieve. Minimum #50 U.S. Standard Sieve (maximum 0.297 mm) for subgrade soils with more than 50 percent particles by weight passing the #200 U.S. Standard Sieve. Design apparent opening size to be selected by the design engineer based on site soil and groundwater conditions.

7. Percent of tensile strength retained as evaluated using ASTM D 4632, "Test Method for Grab Breaking Load and Elongation of Geotextiles" after conditioning for 500 hours.

3.03

TABLE 5-2

CONSTRUCTION SURVIVABILITY RATINGS [1, 2, 3, 4]

Subgrade CDB At Installation	<1		1-2		>2	
Equipment Contact Pressure (psi)	>50	<50	>50	<50	>50	<50
Compacted Thickness Aggregate (in)(5)						
4(6)	NR	NR	H	M	M	M
6	NR	NR	H	H	M	M
12	NR	H	M	M	M	M
18	H	M	M	M	M	M

Notes:

1. From "Geotextile De3sign and Construction Guidelines", Federal Highway Administration, Publication No. FHWA-HI-90-001, October 1989.

2. H-High

3. M-Medium

4. NR-Not Recommended

5. Maximum aggregate size not to exceed one-half the compacted thickness.

6. The 4 in. minimum cover is intended for existing road bases and not intended for use in new construction.

3.04

TABLE 5-3

SEAM RECOMMENDATIONS [1, 2]

Soil Strength (CBR)	Minimum Overlap (ft)
Less than 0.5	(3)
$0.5 \leq CBR < 1$	(3)(4)
$1 \leq CBR \leq 2$	2.5(5)
Greater than 2	1.5(5)

Notes:

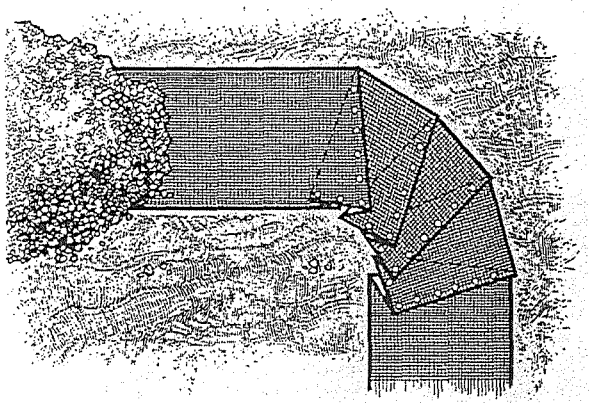
1. Adapted from Task Force 25 and "Geotextile Design and Construction Guidelines", Federal Highway Administration, Publication No. FHWA-HI-90-001, October 1989.

2. Overlap requirements are not applicable to sewn seams.

3. Overlaps are not recommended for soil CBR less than 0.5.

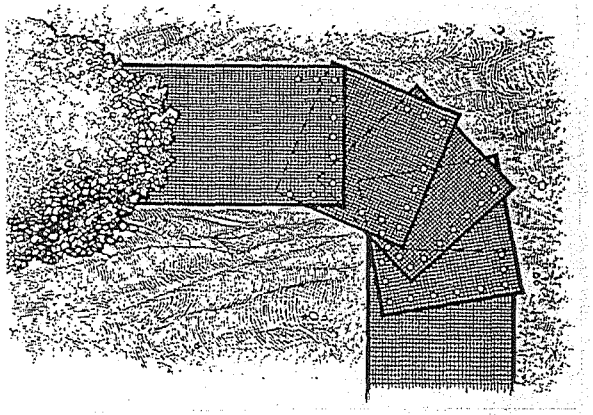
4. Sewn seams of adjacent geotextile rolls are preferred for soil CBR greater than 0.5 but less than or equal to 1.

5. Sewn seams are acceptable for all soil CBRs.



3.05

A. FORMING A CURVE USING FOLDS



3.06

A. FORMING A CURVE USING CUT PIECES

1. ***Figure 5-1:*** Placement of separation geotextile on curves (FHWA, 1989)

   a) (Note: o – indicates locations of pins, sandbags, piles of fill or rock, or other means of temporarily anchoring geotextile. Anchors shall be placed on 2ft. centers minimum.)

END OF SECTION 02343

DIVISION 2 - SITE CONSTRUCTION

SECTION 02373 - SEDIMENTATION AND EROSION CONTROL

1.00 GENERAL

1.01 DESCRIPTION OF WORK

A. The contractor shall provide sediment and erosion controls for all exposed areas within the project limits, throughout the duration of the contract, including any warranty periods. These controls shall include temporary erosion control, temporary sediment control, and final erosion control.

B. Applicable sections: 02315 Excavating, Filling and Grading; 02374 Fertilizing Seeding and Mulching.

1.02 SUBMITTALS

A. All submittals shall be made in accordance with applicable requirements of Division 1.

B. All submittals shall be made within 45 days prior to anticipated placement of material.

C. Material Reports: Submit material reports for the materials supplier under this section. Reports shall include:

1. Source and Location of Material.
2. Name and Address of Producer.
3. Type and Name of Material.

2.00 PRODUCTS

2.01 CONTROL MEASURES

A. Temporary Erosion Control shall include protection of all exposed surfaces within the project limits, by surface grading/rolling, surface water diversion, temporary seeding and/or mulching, or by temporary cover. Alternate methods may be submitted by the contractor for review and approval by the engineer.

B. Temporary Sediment Control shall include silt fence, silt dike, straw bale dikes, temporary sediment checks, etc. Sediment controls shall be placed as required to maintain all sediment within the project boundaries. Sediment controls shall be inspected and cleaned/maintained as necessary to maintain function, following each major runoff event. All temporary sediment controls shall be removed and all surfaces protected upon project completion.

C. Permanent Sediment Controls, if required, shall be as shown on the drawings. Permanent sediment controls shall be constructed and maintained by the Contractor, until accepted at project completion.

D. Final Erosion Control shall include final seeding and mulching, 02374 Fertilizing Seeding and Mulching. Disturbed slopes steeper than 3:1 (horizontal:vertical) shall also require erosion protection fabric in place of the mulch specified in the seeding and mulching specification section. Erosion control fabric shall be utilized as follows:

1. 3:1 to 2:1 Slope, S150 as manufactured by North American Green or Regular Curlex Excelsior Blanket as manufactured by American Excelsior Company or equal.
2. 2:1 to 1:1 Slope, SC150 as manufactured by North American Green or Mid-Velocity Curlex Excelsior Blanket as manufactured by American Excelsior Company or equal.
3. Reference Paragraphs 1.33, A-F in Sections 01110 Summary of Work regarding "equal" products and substitutions.

E. Sediment Control shall include silt fence, silt dike, straw bale dikes, temporary sediment checks, etc. Sediment controls shall be placed as required to maintain all sediment within the project boundaries. Sediment controls shall be inspected and cleaned/maintained as necessary to maintain function, following each major runoff event. All temporary sediment controls shall be removed and all surfaces protected upon project completion. Permanent sediment controls shall be constructed and maintained until accepted at project completion. Permanent sediment controls, if required, shall be as shown on the drawings.

3.00 EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

A. The Contractor shall install control measures as shown on the plans and as necessary or as directed by the Engineer to limit erosion and prevent sediment from leaving the project site. The control measures shall be built in accordance with the project plans, specification and detail drawing, as well as the use of good construction practices.

END OF SECTION 02373

DIVISION 2 - SITE CONSTRUCTION

SECTION 02374 - FERTILIZING, SEEDING & MULCHING

1.00 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. The Contractor shall furnish all seed, labor and materials, and perform all operations in connection with the placing, watering and firming of seeded areas, complete and in strict accordance with these specifications and applicable Drawings, and subject to the terms and conditions of the Contract. The Contractor shall seed all areas disturbed for any reason during construction.

B. Related sections include the following:

1. 02315 Excavating, Filling and Grading
2. 02373 Sedimentation and Erosion Control

2.00 PRODUCTS

2.01 SEED

A. The following percentages for rate, purity and germination will be the minimum requirements in the acceptance of seed, unless otherwise permitted by the Engineer:

TYPE	PURITY	GERMINATION	RATE
Kentucky Bluegrass	85	80	45 lbs./Acre
Redtop	92	85	10 lbs./Acre
Tall Fescue (Alta of Ky.)	97	85	80 lbs./Acre
White Clover	98	85	5 lbs./Acre
Wheat	95	85	10 lbs./Acre

2.02 COMMERCIAL FERTILIZER

A. Shall be composed of a formula 20-12-10. It shall be uniform in composition, dry and free flowing and shall be delivered to the site in the original unopened containers, each bearing the manufacturer's guaranteed analysis. Any fertilizer which becomes caked or otherwise damaged, making it unsuitable for use, will not be accepted.

B. Agricultural limestone with not less than 90 percent passing the No. 4 sieve with percentages of calcium carbonate common to the area or hydrated lime containing not less than 45 percent calcium hydroxide shall be used for soil neutralization, unless otherwise indicated.

2.03 MULCH

A. Vegetative mulch shall be straw from stalks of oats, wheat, rye or barley, or other foliage from plants as approved by the Engineer. The straw shall be relatively free from noxious and undesirable seeds, relatively free from foreign materials and dry enough to evenly spread.

B. Anchoring - Straw mulch shall be crimped into the soil by means of a straw crimper manufactured specifically for such purposes.

3.00 EXECUTION

3.01 TIME OF PLANTING

A. Seeding shall be performed only during the seasons when satisfactory growing conditions exist. The planting operation shall not be performed during times of drought or other unfavorable climatic conditions.

3.02 PLANTING PROCEDURES

A. The areas to be seeded shall be prepared immediately prior to the placing of the seed by thorough cultivating, smoothing, removal of clods, surface stone 1-inch diameter or larger, and weeds. Soil shall be in a moist condition prior to placing seed.

B. Grades on the areas to be seeded shall be maintained in true, even and compacted conditions so as to prevent the formation of depressions. Areas that have washed or eroded shall be brought to grade and compacted thoroughly by the Contractor at his own expense prior to placing the seed. No grading shall be done when the soil is in a muddy or frozen condition.

3.03 APPLYING FERTILIZER

A. The previously described fertilizer shall be applied to the finished grade by approved spreader at the minimum rate of 250 lbs. per acre and shall be thoroughly raked into the top 2 inches of the surface before planting of seed.

B. Lime shall be applied into the top 2 inches of the soil at a rate of 2,000 lbs. per acre by disking, harrowing or raking prior to the planting of seeds.

3.04 PLANTING SEED

A. Seeding Schedule: Seeding shall be performed only during the specific time periods as stated hereafter:

1. March 15 through May 1.
2. August 15 through October 1.

B. Seed mixed in proportions as hereinbefore specified shall be broadcast by approved sowing equipment at the rate of 150 lbs. per acre. The seed shall be covered to an average depth of 1/2 inch by means of a brush harrow, spike tooth harrow, chain harrow, cultipacker, or other approved device.

C. Mulch shall be evenly distributed at a rate of 2 tons per acre over the seeded area within 24 hours following seeding. The mulch shall be crimped into the soil to reduce movement due to wind or erosion. After mulching, precautions to prohibit foot or vehicular traffic over the area should be taken.

D. When delays in operations carry the work beyond the most favorable planting season for the grasses designated, or when conditions are such, by reason of drought, high winds, excessive moisture, or other factors, that satisfactory results are not likely to be obtained, the seeding operation shall be stopped and work shall be resumed only when conditions are favorable again or when approved alternate or corrective measures and procedures have been put into effect. If inspection during seeding operations or after there is a show of green indicates that areas have been skipped, the sowing of additional seed on these areas will be required.

E. The seeded areas will be inspected for acceptable grass coverage and will be acceptable when the grasses designated are growing and are in good condition, and no area more than 1/2 of one percent of the total areas shall be bare, of which no single areas shall be more than three square feet in area. Any area larger than this will not be acceptable and shall be reseeded.

3.05 MAINTENANCE

A. All seeded areas shall be kept in a healthy, growing condition by watering, mowing, rolling, trimming, edging, etc., until completion and acceptance by the Owner.

B. Reconditioning Existing Areas:

1. Existing areas damaged by the Contractor's operations (e.g. Contractor's storage areas) including storage of materials and equipment and movement of vehicles are to be reconditioned. Contractor is also to recondition existing grass areas were minor regrading is required.

2. Contractor is to provide fertilizer, seed, lime and mulch as required for reconditioned areas as well as new soil as may be required to fill low spots to finished grade.

3. Contractor is to remove diseased and unsatisfactory grass areas. These grasses shall not be buried in the soil at a depth less than 24". Contractor shall remove topsoil containing foreign materials resulting from the contractor's operation including oil drippings, stone, gravel, and other materials as directed by the Owner's Representative.

4. Where substantial grass remains (but is thin) the Contractor shall mow, rake, aerate (if compacted), fill low spots, remove humps, cultivate, fertilize, seed and mulch in accordance with these specifications.

C. Overwinter protection: If the site cannot be seeded during the fall planting period, immediately following the grading operations the Contractor shall be required to stabilize the project site with either straw mulch or a temporary seed crop of wheat or oats. Such operations, if required, will be performed at no additional cost to the Owner.

1. If the Contractor chooses to mulch the project site, he shall do so at the same rate and by the same methods as previously described in this section for mulching operations.

2. If the Contractor chooses to sow a temporary seed crop, he shall submit proposed rates of application to the Consultant for approval. All seeding shall be complete prior to November 1st.

3. The permanent grass species shall not be drilled directly into the mulched or temporary seeded areas. Temporary mulch or grass species shall be incorporated to a depth of 6" by disking, harrowing or other approved methods or shall be disposed of in a manner approved by the Owner's Representative. All operations previously described under this section for seedbed preparation, liming, and fertilization shall be performed prior to Spring seeding.

4. The seedhead of the temporary crop shall not be allowed to mature. Should the Contractor be unable to incorporate this crop prior to seedhead maturity, he should mow the crop to prevent maturity. Should wet conditions not allow the contractor to mow the crop and the seedhead matures, the contractor shall combine the crop to prevent a volunteer cereal crop.

D. Temporary Stabilization: Topsoil stock piles and disturbed portions of the site where construction activity temporarily ceases for at least 21 days shall be stabilized with temporary seed or mulch no later than 14 days from the last construction activity in that area. The temporary seed crop shall be wheat or oats. Such operations, if required, will be performed at no additional cost to the Owner.

1. If the Contractor chooses to mulch the project site, he shall do so at the same rate and by the same methods as previously described in this section for mulching operations.

2. If the Contractor chooses to sow a temporary seed crop, he shall submit proposed rates of application to the Consultant for approval.

3. The permanent grass species shall not be drilled directly into the mulched or temporary seeded areas. Temporary mulch or grass species shall be incorporated to a depth of 6" by disking, harrowing

or other approved methods or shall be disposed of in a manner approved by the Owner's Representative. All operations previously described under this section for seedbed preparation, liming, and fertilization shall be performed prior to Spring seeding.

4. The seedhead of the temporary crop shall not be allowed to mature. Should the Contractor be unable to incorporate this crop prior to seedhead maturity, he should mow the crop to prevent maturity. Should wet conditions not allow the contractor to mow the crop and the seedhead matures, the contractor shall combine the crop to prevent a volunteer cereal crop.

E. The Contractor shall protect all seeded areas from damage of any sort due to operations of other contractors and trades, and trespassers. Maintenance shall commence immediately following seeding operations and shall continue throughout the guarantee period. Contractor shall repair or replace damaged areas as directed by the Consultant.

END OF SECTION 02374

DIVISION 2 - SITE CONSTRUCTION

SECTION 02377 - EMBANKMENT PROTECTION

1.00 GENERAL

1.01 DESCRIPTION OF WORK

A. The work shall consist of slope or bank protection, constructed in locations as indicated on the drawings.

B. Construction of embankment protection shall consist of preparation of subgrade and placement of the embankment protection.

C. Applicable Sections: 02315 Excavating, Filling and Grading; 02374 Fertilizing, Seeding, and Mulching

1.02 SUBMITTALS

A. All submittals shall be made in accordance with applicable requirements of Division 1.

B. All submittals shall be made within 45 days prior to anticipated placement of material.

C. Material Reports: Submit material reports for the materials supplier under this section. Reports shall include:

1. Source and Location of Material.
2. Name and Address of Producer.
3. Type and Name of Material.
4. Gradation/Sizes.

2.00 PRODUCTS

2.01 ROCK BLANKET MATERIAL

A. The material for rock blanket shall be durable stone or broken concrete containing a combined total of not more than 10 percent of earth, sand, shale, and non-durable rock. It is preferable that the material contain a large percentage of pieces as large as the thickness of the blanket will permit, with enough smaller pieces of various sizes to fill the larger voids.

B. For Type 1 Rock Blanket, at least 40 percent of the mass shall be of pieces having a volume of one cubic foot or more. For Type 2 Rock Blanket, at least 60 percent of the mass shall be of pieces having a volume of one cubic foot or more. Generally the material shall range between 3 lbs. and 150 lbs. in size. Acceptance of quality and size of material may be made by visual inspection at the job site or place of manufacture.

3.00 EXECUTION

3.01 CONSTRUCTION REQUIREMENTS FOR ROCK BLANKET

A. The stone material shall be placed in such a manner as to produce a reasonably well graded mass of rock and shall be constructed to the lines and grade shown on the plans. The stone shall be placed on a geotextile fabric similar to Amoco Woven 1198 geotextile fabric or equal that has been attached to the subgrade as per manufacturer's requirements to its full course thickness at one operation. The finish blanket shall be free of objectionable pockets of small stones or clusters of large stones. Placing of the stone in layers will not be permitted. Rearranging of individual stones by mechanical equipment or hand will be required to the extent necessary to obtain a reasonable well graded distribution of stone. The blanket shall be a minimum of 18" thick for Type I and a minimum of 24" thick for Type 2. All rock blanket shall be Type 1, unless otherwise noted.

END OF SECTION 02377

DIVISION 2: SITE CONSTRUCTION

SECTION 02510 - WATER DISTRIBUTION

1.00 GENERAL

1.01 DESCRIPTION OF WORK

A. The work to be performed under this section consists of furnishing all materials, equipment and supplies, tools and pipe; the performance of all necessary labor for the construction of the water piping included in this Contract, complete with valves, accessories and all necessary components.

B. All work shall be completed in accordance with the project plans and details.

C. Applicable Sections: 02315 Excavating, Filling and Grading; 02080 Utility Materials

1.02 QUALITY ASSURANCE

A. Work shall conform to all local building codes.

B. All codes referred to are those listed by:

1. American Society for Testing Materials (ASTM).
2. American Water Works Association (AWWA).
3. American Standards Association (ASA).
4. Commercial Standards (CS).
5. American Association of State Highway & Transportation Official (AASHTO).
6. Federal Specifications.

Codes and standards referred to above shall be the current edition which is being used at the time of bid opening.

C. All materials and equipment used on this work shall be new, of the best quality and shall meet the requirements of these specifications. Materials shall be sampled and tested in accordance with current ASTM Specifications or such others as specified hereinafter. The Contractor will be required to furnish certificates of conformance to ASTM or other applicable specifications. Materials shall be stored in such a manner that their conditions are equivalent to new when installed.

D. Submittals on pipe, valves and other accessories shall include manufacture, pressure class, materials of construction, reference AWWA or ASTM Standards the equipment complies with, and catalog cuts or shop drawings showing layout dimensions.

E. Whenever in these specifications reference is made to the requirements of the ASTM, AWWA, ASA, or other standard specifications, it shall be understood that references are made to the latest modifications or revisions of such specifications.

F. All material to be used in this work will be inspected before being placed and all rejected material must be removed immediately and not used in the work under this contract. Any material installed or placed without inspection shall be removed and replaced with new materials if so directed by the Inspector.

G. The Contractor shall be required to furnish such laborers as may be necessary to aid the Inspector in the examination and culling of material.

H. The Contractor shall pay for all tests required by the specifications. Such tests shall be performed by a competent independent laboratory approved by the Engineer on test specimens selected by the Contractor under the direct supervision of the Engineer. Copies of all test results shall be submitted to the Engineer directly from the testing laboratory.

2.00 PRODUCTS See Section 02080-Utility Materials for material specifications.

3.00 EXECUTION

3.01 SHIPPING AND HANDLING

A. Handle pipe in a manner to ensure installation in sound, undamaged condition using proper equipment, tools and methods, as follows:

1. Suitable slings or skids.

2. Without hooks in contact with joint surfaces.

3. Provisions for preventing contact with adjacent units during moving or storage.

4. Protection for all pipe ends such as beveled ends, flanges, mechanical joints, plain ends, threads, etc., prior to shipping to job site.

3.02 PIPE INSPECTION

A. All pipe shall be subject to approval of the Engineer.

B. Pipe sections damaged by handling which, in the opinion of the Engineer, cannot be satisfactorily repaired shall be rejected. This shall include, but is not limited to, broken bells and spigots, bent bell-and-spigot rings, excessive deflection and similar damage.

3.03 CLEANING

A. Thoroughly clean interior of all pipe, fittings and joints before installation.

B. Exclude foreign matter during installation by providing temporary covers over end of pipe, if necessary.

C. Do not place tools, clothing or materials at any time in pipe.

D. Visually inspect and remove all articles in pipe, brush or flush clean immediately prior to final fitting of system.

3.04 INSTALLATION OF BURIED PIPING

A. Proper implements, tools and facilities satisfactory to the Resident Project Representative, shall be provided and used by the Contractor for the safe and convenient execution of the work. All pipe, fittings and valves shall be carefully lowered in the trench piece by piece by means of a derrick, ropes or other suitable tools or equipment in such a manner as to prevent damage to piping materials and protective coatings and linings. Under no circumstances shall materials be dropped or dumped into the trench.

B. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. If the pipe laying crew cannot install the pipe in place without getting earth into it, the Contractor will be required before lowering the pipe into the trench, to place a heavy, tightly woven bag over each end of the pipe to be left in place until the connection is made to the adjacent pipe. During laying operations, no debris, tools, clothing or other material shall be placed in the pipe. At times when pipe laying is not in progress, the open ends of pipe must be closed by a watertight plug or other suitable means to seal the open end of the pipe.

C. Wherever possible, pipe shall be laid with bell ends facing upstream (in the direction of laying). Wherever it is necessary to deflect the pipe from a straight line either in the vertical or horizontal plane to avoid obstructions, the angle of the deflection allowed shall not exceed that recommended by the manufacturer of the pipe. The use of fittings to make vertical bends shall be subject to the approval of the Engineer.

D. Preparatory to making pipe joints, the joint material on both the bell and spigot ends shall be thoroughly cleaned and coated with the proper lubricant or cement to facilitate assembly. The spigot end shall be inserted in the bell and pressure applied until the pipe is properly sealed.

E. Thrust blocks as indicated shall be installed at all elbows, tees, reducers, valves, caps, etc.

F. Trenching shall comply with Section 02315. Trench should be sufficiently wide to permit tamping around pipe. Bottom should be smooth and cleared of stones or protruding hard objects. Pipe should be supported over its entire length.

G. All piping is to have a minimum of 42" of cover over the pipe, unless otherwise specified. All Water pipes installed on State or County right-of-way (either in the flowline or on the side slopes) shall have a minimum cover of 60".

H. Backfill operations shall commence immediately after laying pipe in trench upon authorization of the inspector.

I. The Contractor shall furnish and install a continuous #12 AWG solid copper locator wire with THWN insulation in trench with all pressure pipelines prior to backfilling operations. Locator wire shall be looped up on the outside of valve boxes and inserted into the valve boxes through a drilled hole approximately 12" below ground level with sufficient length for testing purposes. All splices in the locator wire shall be made with 3M direct buy splice kits. Splices in the locator wire shall be kept to a minimum number as reasonably possible.

J. Locator Wire Color Code:

Water - Blue Insulation

K. No pipe shall be laid in water or in trench conditions unsuitable for laying water pipe in conformance with these specifications.

L. The Contractor shall provide adequate equipment to eliminate "skips" during the trenching operation. Skips will not be permitted unless approved by the Engineer or Resident Project Representative.

3.05 DUCTILE IRON PIPE INSTALLATION

A. Installation shall conform to the requirements of AWWA C600 and the following:

1. Mechanical Joints: The outside of the spigot and inside of the bell of mechanical joint pipe shall be thoroughly cleaned to remove all foreign matter from the joint. The cast iron gland shall then be slipped on to the spigot end of the pipe with the lip extension of the gland toward the socket or bell end. The rubber gasket shall be placed on the spigot end with the thick edge toward the gland. The pipe shall be pushed forward to completely seat the spigot end in the bell. The gasket shall then be pressed into place within the bell, being careful to have the gasket evenly located around the entire joint. The ductile iron gland shall then be moved along the pipe into position and bolted. Nuts spaced 180 degrees shall be tightened alternately to AWWA C600 standards in order to produce an equal pressure on all parts of the gland.

2. Flanged Pipe: Install piping with flanged carefully faced and properly bolted, without piping being subject to unnecessary or excessive strains.

3. Assemble pipelines from full lengths of pipe, using short sections only where required.

4. Provide flanges or unions as applicable at all equipment connections and as otherwise required.

5. An anti-seize compound designed for 1000 degrees F shall be the lubricant for all flange bolt and stud threads, with the compound applied to male threads only.

3.06 COPPER AND PVC PIPE

A. Copper and/or PVC Piping shall be installed in accordance with the manufacturer's recommendations and at depths and conditions specified.

3.07 VALVES AND ACCESSORIES

A. All valves and accessories for the piping systems shall be installed in accordance with the manufacturer's recommendations.

3.08 LINES AND GRADES

A. The general alignment of the new main is shown on the drawings. Minimum covers shall be 42" to top of pipe with the only exceptions being where tie-ins are to existing mains less than 42" deep. Where the new main conflicts with another pipeline or structure, the new main shall pass beneath such pipeline or structure.

3.09 SEPARATION OF WATER MAINS, SANITARY SEWERS AND COMBINED SEWERS

A. Parallel Installation:

1. Water mains shall be laid at least ten feet horizontally from any existing or proposed sewer. The distance shall be measured edge to edge.

2. If specifically approved by IEPA installation of the water main closer to a sewer may be allowed, provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer and on either case, at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer.

3. In areas where the recommended separations cannot be obtained, either the waterline or the sewer line shall be constructed of mechanical joint pipe or cased in a continuous casing.

B. Crossings:

1. Water mains crossing sewers shall be laid to provide a minimum vertical clear distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer.

2. A full length of water pipe shall be located so both joints will be as far from the sewer as possible but in no case less than ten feet. Special structural support for the water and sewer pipes may be required.

3. In areas where the recommended separations cannot be obtained either the waterline or the sewer line shall be constructed of mechanical joint pipe or cased in a continuous casing that extends no less than ten feet on both sides of the crossing.

C. Exception:

1. Any variance from the specified separation distances in paragraphs A and B must be submitted to IEPA for approval.

D. Force Mains:

1. There shall be at least a ten-foot horizontal separation between water mains and sanitary sewer force mains and they shall be in separate trenches.

2. In areas where these separations cannot be obtained, either the waterline or the sewer line shall be cased in a continuous casing.

E. Sewer Manholes:

1. No waterline shall be located closer than ten feet to any part of a sanitary or combined sewer manhole.

F. Disposal Facilities:

1. No waterline shall be located closer than 25 feet to any on-site wastewater disposal facility, agricultural waste disposal facility, or landfill.

G. In the event ductile iron water main pipe is required and no bid item exists for ductile iron pipe, the Contractor shall be paid only for the additional cost of material used in lieu of specified materials.

3.10 PRESSURE AND LEAKAGE TESTS

A. After the pipe has been installed and backfilled as specified, all newly laid pipe shall be subjected to the hydrostatic pressure of 1.5 times the working pressure or the rated pressure of the pipe, whichever is less, with a minimum test pressure of 100 psi. The duration of each pressure test shall be at least one (1) hour. Each valve section shall be tested independently. The Contractor shall furnish the gauge and measuring device for the leakage test, as well as the pump, pipe, connections and all other necessary apparatus, and shall furnish all necessary labor to conduct the test.

B. All tests shall be made in the presence of the Resident Project Representative or his authorized representative. The contractor shall notify the Resident Project Representative at least twenty-four (24) hours before any work is to be tested.

C. All connections to piping systems shall be completed prior to testing unless otherwise authorized by the Engineer.

D. All pipe shall be slowly filled with water to the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer. The pump, pipe connections and all necessary apparatus, including gauges, shall be furnished by the Contractor. The Contractor will furnish the gauges for the test and will make all taps into the pipe for conducting the tests.

E. Before applying the specified test pressure, all air shall be expelled from the pipe. If blowoffs are not available at necessary locations, the Contractor shall make the taps at the necessary locations before the test is made and insert the plugs after the test has been completed.

F. The duration of each leakage test shall be one hour, and during the test, the piping shall be subjected to a hydrostatic pressure of 1.5 times the working pressure or the rated pressure of the pipe, whichever is less with a minimum test pressure of 100 psi. No pipe installation will be accepted until the leakage is less than ten (10) gallons per mile of pipe per inch diameter per 24 hours. Should any tests of pipe laid disclose leakage greater than that specified, the Contractor shall, at his own expense, locate and repair the defective joints until the leakage is within the specified allowance.

G. The pressure and leakage tests are only an indication to the Owner that the distribution system, including service lines, may be fit for use at the time the tests were performed. In no way does the pressure or leakage test relieve the Contractor of his responsibility under the terms of the contract agreement.

H. The Contractor shall be responsible for all arrangements and costs for all water and power used during filling, flushing, and testing of the complete project until final acceptance by Owner.

3.11 DISINFECTION OF PIPING SYSTEMS

A. General: After all piping has been installed and satisfactorily tested for strength and water tightness, the interior of all pipe, fittings and other accessories shall be flushed and disinfected with chlorine. This work shall be done by the Contractor under the supervision of the Inspector. All materials, equipment and arrangements shall be furnished by the Contractor. Laboratory tests will be made by the Contractor.

B. Flushing: Flushing shall be done by turning the system's pressure into one end of the newly laid pipe and discharging it to waste at the other end through flush valves or hydrant heads. Flushing shall continue until the effluent appears clear to the eye when viewed through a drinking glass. Contractor shall provide temporary flushing devices on lines not equipped with suitable flushing device.

C. Chlorination:

1. Disinfection of the piping systems shall be in accordance with AWWA C651 and may be of the continuous-feed or slug method.

a. Continuous Feed Method

i. Calcium hypochlorite granules may be placed in the main during construction, but this is optional. If calcium chlorite granules are used, quantities should be applied in accordance with Table 1.

ii. Before the main is fully chlorinated, it shall be fully filled to remove air pockets and then it shall be flushed.

iii. Water entering the new main shall receive a dose of chlorine, not more than 10 feet downstream from the beginning of the new main, and shall be fed at a constant rate such that the water will have not less than 25 mg/L free chlorine.

iv. Chlorine application shall not cease until the entire main is filled.

v. The chlorinated water shall remain in the main for at least 24 hours. Valves and hydrants shall be operated at this time to ensure disinfection of the appurtenances.

vi. The chlorinated water shall have a minimum residual of 10 mg/L of free chlorine after the 24 hour period.

b. Slug Method

i. Calcium hypochlorite granules shall be placed in the main during construction in quantities as shown in Table 1.

ii. Before the main is fully chlorinated, it shall be fully filled to remove air pockets and then it shall be flushed.

iii. After flushing, at a point not more than 10 feet downstream from the beginning of the new main, a slug of water dosed with chlorine to a concentration of 100 mg/L shall be fed through the pipe.

iv. As the chlorinated water flows past fittings, valves and hydrants, they shall be operated so as to disinfect appurtenances and pipe branches.

v. All interior surfaces shall be exposed for at least three (3) hours.

Table 1

Ounces of calcium hypochlorite granules to be placed at beginning of main and at each 500 ft interval

Pipe Diameter inches	Calcium Hypochlorite Granules oz.
4	1.7
6	3.8
8	6.7
10	10.5
12	15.1
14 and larger	D^2x15.1

Where D is the inside pipe diameter in feet $D = d/12$

2. Following chlorination, all the water in the main shall be flushed from the pipeline until the replacement water throughout its entire length shall, upon test, be proven comparable to the quality of water served the public from the existing water supply system and approved by the authorities having jurisdiction.

3. Should the initial treatment fail to result in conditions specified above, the chlorination procedure shall be repeated until such results are obtained.

4. After all sterilization has been completed satisfactorily, the Contractor shall dismantle the equipment, plug temporary taps and outlets, and restore all areas to their final required condition.

END OF SECTION 02510

DIVISION 2 – SITE CONSTRUCTION

SECTION 02536 - SANITARY SEWER MANHOLES, FRAMES AND COVERS

1.00 GENERAL

1.01 DESCRIPTION OF WORK

A. Manholes are to be new and constructed in accordance with the drawings and the typical details. Unless otherwise specified, they shall be pre-cast concrete.

B. The cast iron manhole lids and frames to be furnished and installed is as indicated on the drawings and specified herein.

C. Manhole steps are to be provided and installed in all concrete manholes which are a part of this project and are either mentioned in these specifications or in the drawings.

D. Job Conditions: It shall be the responsibility of the Contractor to see that accessories required to be cast in concrete are available at that time.

E. Applicable Standards:

1. American Society for Testing and Materials (ASTM).

2. Federal Specifications.

3. American Association of State Highway and Transportation Officials (AASHTO).

F. Shop drawings shall be required in accordance with Division 1 requirements.

G. Applicable Sections: 02315 Excavating, Filling and Grading; 02537 Sewage Collection Lines; 03050 Portland Cement Concrete; 09900 Paints and Coatings.

2.00 PRODUCTS

2.01 BASE

A. Base and bottom section walls shall be pre-cast monolithically.

2.02 PRE-CAST CONCRETE MANHOLES

A. ASTM C478, sized as indicated. They shall have eccentric cone pre-cast tops unless otherwise indicated on the drawings. Absorption of the concrete shall not exceed 8 percent of the dry weight as determined by ASTM C497 (ten minute soaking test). Permeability Tests (ASTM C497 section filled with water) may be required prior to installation of any section which the Engineer deems necessary after visual inspection.

B. Precast sections shall be aligned to provide vertical sides and vertical alignment to the steps. The completed manhole shall be rigid, true to dimensions and be watertight.

C. Flat-top and drop manholes shall be built in accordance with the project details.

2.03 PRE-CAST MANHOLE PIPE SEALS

A. All pre-cast concrete manholes shall include a compressive-type joint for sewer pipe seals that provides 10 degrees of omnidirectional deflection to eliminate infiltration due to settlement or ground movement.

B. The compression type pipe seal is to be cast integrally into the pipe opening of the manhole at the time of manufacture. The seal shall be a one-piece, compression type joint with no moving parts meeting the performance and test requirements of ASTM C923.

C. The manhole pipe seal shall be similar to A-LOK Products Corporation or meet performance requirements of ASTM C-923 for "Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes".

2.04 MANHOLE DAMPROOFING AND COATINGS

A. The manhole damproofing shall be a solvent based asphalt non-fibered coating similar to Uniseal 1600 by Anchor-Tite, Gicahn Manufacturing Company, Inc., Kansas City, Missouri, or approved equal and shall be applied by the pre-caster.

B. Refer to Section 09900, Paints and Coatings.

2.05 BUTYL SEALANT

A. The butyl sealant used to seal joints between manhole sections shall be a flexible butyl resin sealant similar to Con-Seal CS-302 by Concrete Sealants, Inc., New Carlisle, Ohio, or approved equal.

2.06 FRAME AND LID

A. General: Gray iron castings shall be as manufactured by Neenah Foundry Co., of Neenah, Wisconsin, East Jordan Iron Works, Inc., of East Jordan, Michigan, or approved equal. They shall be of uniform quality, free from blowholes, porosity, hard spots, shrinkage distortion or other defects. They shall be smooth and well-cleaned by sandblasting.

B. Quality: Materials used in the manufacture of castings shall conform to ASTM A48, Class 30 or better.

C. Finish: All castings shall be manufactured true to pattern; component parts shall fit together in a satisfactory manner. Round frames and covers shall have machined bearing surfaces to prevent rocking and rattling.

D. Weight: All weights as given are average (and approximate) values. Deviation shall not exceed tolerances by ASTM Standards

E. Manhole Frame and Lid: For sanitary sewer.

1. 380 pound casting
2. Clear opening of 24" diameter
3. Lid diameter of 26"
4. Frame base diameter of 36"
5. Type "C - Self Sealing" with 2" high lettering indicating "Sanitary Sewer".
6. Similar to Neenah R-1642

2.07 STEPS

A. The manhole steps shall be fabricated from plastic covered grade 60 1/2" diameter reinforcing steel rod. The manhole step shall be similar to M.A. Industries, Inc. Model PSI-PF, American Step Co., Inc., Model ML-10, or approved equal.

3.00 EXECUTION

3.01 PRE-CAST CONCRETE MANHOLES

A. Shop drawings are required to determine total height and size and number of sections required to attain finished elevation.

B. Bottom section to be pre-cast monolithically with bottom section walls, unless approved by the Engineer.

C. If the construction requires that the bottom of the manhole and inverts be cast-in-place, the following procedure shall be used:

1. The "dog house" manhole section shall be positioned over the existing pipe and support by solid concrete block, so that it does not bear directly on any of the pipe. The bottom of this section shall be at an elevation that permits a minimum of 2" of penetration into the floor once it is poured.

2. Reinforcing steel shall be placed and tied in accordance with the detail drawings.

3. Concrete has been placed to create the floor, inverts and seals around the pipes.

4. The construction shall provide an integral watertight unit.

D. All sections to be of size for easy and safe handling with equipment available to the Contractor.

E. Joints shall be sealed with two rings of (1" minimum) premolded butyl sealant material at the interface between the precast sections.

F. All exterior surfaces of the manhole must be waterproofed with an asphaltic coating by the pre-caster. Once the manhole has been installed, the contractor shall apply coating to any exposed concrete.

G. Pre-cast sections shall be placed and aligned to provide vertical sides and vertical alignment of the steps. The completed manhole shall be rigid, true to dimensions and be watertight.

H. Backfilling shall be done carefully with selected earth fill, free from rocks and debris, without injury to the manhole.

I. The distance that can be made up with masonry units between the cone top and the base of the frame shall not exceed 12" or use more than two units.

J. All lift holes on pre-cast elements for manholes shall be completely filled with non-shrink, non-metallic grout.

3.02 MANHOLE TOPS

A. Shall be eccentric cones, unless otherwise specified or if conditions are too shallow, they shall be a flat top slab.

B. Flat top slabs shall be constructed of cast-in-place or pre-cast concrete of adequate section, material and reinforcement to support a concentrated wheel load of eight (8) tons, plus 100% impact.

3.03 MANHOLE INVERTS

A. Inverts to be carefully constructed and shaped with Portland Cement Concrete to maintain proper velocities through the manhole.

B. In no case shall the invert sections through the manhole be greater than that of the outgoing pipe.

C. The shape of the invert shall conform exactly to the lower half of the pipe it connects.

D. Side branches shall be connected with as large of a radius of curve as practical.

E. All inverts shall be plastered, troweled and brushed to a smooth, clean surface.

F. Concrete placed between the invert and the walls of the manhole shall slope up from the invert as shown on the typical details.

3.04 FRAMES AND LIDS

A. All manhole frames and lids to be set level true to grade or specified elevation.

B. All manhole frames shall be sealed to the tops with a flexible butyl sealant.

C. Manhole frames that are to be cast in concrete slabs shall be set level and flush with finish surface of slab.

1. Position to prevent any ponding of water at the manhole frames when finished.

2. Anchor securely in position before placing concrete.

3. Adequately vibrate concrete at frame to insure proper seal between frame and concrete.

D. Properly clean all frames and lids from mud, concrete or other foreign matter.

E. All frames and lids shall be in place before final acceptance and payment.

3.05 STEPS

A. The manhole steps shall be fabricated from plastic covered grade 60, ½" diameter reinforcing steel rod. The manhole step shall be similar to M.A. Industries, Inc. Model PSI-PF, American Step Co., Inc., Model ML-10, or approved equal.

The manhole steps shall be polypropylene plastic coated reinforcing steel. The portion of the step to be embedded in the concrete shall have a configuration such that it will prevent any pullout. The steps shall have properties such that they will withstand a single concentrated load of three-hundred (300) pounds without distortion on that portion protruding from the wall. The steps shall be a minimum of twelve (12") inches wide and shaped to prevent the foot from slipping off the side. The step shall project a minimum distance of four (4") inches from the wall of the riser or cone section measured from the point of embedment. The steps shall be embedded a minimum distance of three (3") inches. All steps shall be constructed, textured and installed in accordance with current OSHA standards.

3.06 ACCEPTANCE TEST

A. Upon completion of the sewers, acceptance tests will be conducted by the Contractor in the presence of the Engineer to determine the acceptability of the manholes.

B. Each manhole shall be subjected to an exfiltration test. The manhole to be tested shall be isolated from the sewer lines by installing pneumatic plugs in the sewer lines using the same procedures as for air testing, except that the plugs shall be installed in such a manner that there is a clear distance of at least 18" between the inside face of the manhole and the face of the plug.

1. Hydraulic Testing: The manhole shall then be filled with water to a depth just below the top of the manhole. Depth shall be at least 3' above ground water. A liquid level measure shall be made and recorded after initial filling and 15 and 30 minutes thereafter. The test is acceptable when no water loss is observed between the 15 and 30 minute readings. Addition of water during the testing shall not be allowed.

OR:

2. Vacuum Testing: The vacuum test head shall be placed at the top of the manhole in accordance with the manufacturer's recommendations. A vacuum of 10" of mercury shall be drawn on the manhole. The valve on the vacuum line of the test head shall be closed.The vacuum pump shall be shut off. The time shall be measured for the vacuum to drop to 9" of mercury. The manhole shall pass if the time for the vacuum reading to drop from 10"of mercury to 9" of mercury meets or exceeds the values indicated below. If the manhole fails the initial test, necessary repairs shall be made by an approved method. The manhole shall then be re-tested until a satisfactory test is obtained.

DEPTH	DIAMETER (IN.)		
(FT.)	up to 48	48-60	Over 60
		Time (Seconds)	
Up to 20'	45	60	90
20' and up	60	90	120

C. Once vacuum testing has been completed, the top elevation of the manhole shall be rechecked. If the completion of the test has compressed the manhole in such a manner that grade rings are required, the grade rings will be installed and the manhole retested.

END OF SECTION 02536

DIVISION 2 – SITE CONSTRUCTION

SECTION 02537 - GRAVITY SEWAGE COLLECTION LINES

1.00 GENERAL

1.01 DESCRIPTION

A. The work in this section consists of furnishing all materials, accessories, equipment, tools, transportation, services, labor and performing all operations required to complete the gravity sewer pipeline, and related appurtenances, as shown on the drawings and as herein specified. Provide all work in this section in place, complete and ready for service.

B. Applicable Sections: 02080 Utility Materials; 02315 Excavating, Filling and Grading; 02536 Sanitary Sewer Manholes, Frames and Covers.

1.02 QUALITY ASSURANCE

A. Work shall conform to all local building codes.

B. All codes referred to are those listed by:

1. American Society for Testing Materials (ASTM).
2. American Standards Association (ASA).
3. Commercial Standards (CS).
4. American Association of State Highway & Transportation Official (AASHTO).
5. Federal Specifications.
    a) Codes and standards referred to above shall be the current edition which is being used at the time of bid opening.

C. All materials and equipment used on this work shall be new, of the best quality and shall meet the requirements of these specifications. Materials shall be sampled and tested in accordance with current ASTM Specifications or such others as specified hereinafter. The Contractor will be required to furnish certificates of conformance to ASTM or other applicable specifications. Materials shall be stored in such a manner that their conditions are equivalent to new when installed.

D. Submittals on pipe and other accessories shall include manufacture, pressure class, materials of construction, reference the ASTM Standard the equipment complies with, and catalog cuts or shop drawings showing layout dimensions.

E. Whenever in these specifications reference is made to the requirements of the ASTM, ASA, or other standard specifications, it shall be understood that references are made to the latest modifications or revisions of such specifications.

F. All material to be used in this work will be inspected before being placed and all rejected material must be removed immediately and not used in the work under this contract. Any material installed or placed without inspection shall be removed and replaced with new materials if so directed by the Inspector.

G. The Contractor shall be required to furnish such laborers as may be necessary to aid the Resident Project Representative in the examination and culling of material.

H. The Contractor shall pay for all tests required by the specifications. Such tests shall be performed by a competent independent laboratory approved by the Engineer on test specimens selected by the Contractor under the direct supervision of the Engineer. Copies of all test results shall be submitted to the Engineer directly from the testing laboratory.

1.03 SUBMITTALS

A. Submit as specified in Division 1. Included, but not limited to the following:
   1. Layout Drawings.
   2. Materials Specifications.
   3. Complete Details of Pipe and Fittings.
   4. Bill of Materials.
   5. Factory and field test reports.

2.00 PRODUCTS

2.01 GENERAL

A. See Section 02080, Utility Materials for pipe and material specifications.

B. All pipe and other materials used in the construction of sanitary sewer systems shall be of the type indicated on the drawings and as indicated in these specifications. All pipe and specials will be subject to inspection by the Engineer. All damaged pieces as well as any pieces not conforming to these specifications shall be immediately removed and replaced with pipe and specials as may be acceptable to the Engineer at the expense of the Contractor.

3.00 EXECUTION

3.01 SHIPPING AND HANDLING

A. Handle pipe in a manner to ensure installation in sound, undamaged condition using proper equipment, tools and methods, as follows:

   1. Suitable slings or skids.

   2. Without hooks in contact with joint surfaces.

   3. Provisions for preventing contact with adjacent units during moving or storage.

   4. Protection for all pipe ends such as beveled ends, flanges, mechanical joints, plain ends, threads, etc., prior to shipping to job site.

3.02 PIPE INSPECTION

A. All pipe shall be subject to approval of the Engineer.

B. Pipe sections damaged by handling which, in the opinion of the Engineer, cannot be satisfactorily repaired shall be rejected. This shall include, but is not limited to, broken bells and spigots, bent bell-and-spigot rings, excessive deflection and similar damage.

3.03 CLEANING

A. Thoroughly clean interior of all pipe, fittings and joints before installation.

B. Exclude foreign matter during installation by providing temporary covers over end of pipe, if necessary.

C. Do not place tools, clothing or materials at any time in pipe.

D. Visually inspect, remove all articles in pipe, brush or flush clean immediately prior to final fitting of system.

3.04 GRAVITY SEWER INSTALLATION

A. Terminology: The haunch is the triangular shaped area in the trench next to the bottom half of the pipe extending from the spring line of the pipe to the bedding material.

1. The terms consolidate, compact, tamp and density are widely used in describing soil consolidation efforts in sewer pipe construction. They have varying implications as to technique. The term densify is used in this document without distinction as to method.

2. Graded soils are those containing a mixture of several different sized particles.

3. Select native soil, as described by visual inspection, is clean of Class V type material and debris, normally finely divided and not highly saturated with water.

4. Spring line of pipe is the horizontal centerline of the pipe.

5. Bedding is the material required beneath the pipe used to support the pipe and bring the pipe to grade above the foundation.

6. Initial backfill is the material above the haunching extending to 6 inches above the top of the pipe which is carefully placed to provide protection to the pipe during subsequent backfilling operations.

7. Final backfill is the material from the top of the initial backfill to the finish grade (minus pavement replacement – if required).

B. Unless otherwise specified on the plans, SDR 35 PVC pipe shall be used on installation up to 14', SDR 26 PVC shall be used on installations greater than 14' but not exceeding 24', DIP shall be used on installations over 24'.

C. The pipe shall be bedded true to line and grade with uniform and continuous support from a firm base. Blocking with wood, brick, or any hard object shall not be used to bring the pipe to grade. Foundations, bedding and backfill shall be constructed to provide even restraint and support in all directions.

D. Special Situation:

1. Bell Holes for Elastomeric Seal Joints: As specified in ASTM D 2321.

2. Minimum Cover for Load Application: As specified in ASTM D 2321.

3. Use of Compaction Equipment: As specified in ASTM D 2321.

4. Removal of Trench Protection: As specified in ASTM D 2321.

5. Water Densification: When required, use water flooding, puddling or jetting only after the Engineer inspects conditions and approves the practice. These methods are most successful with Class II and III soils while normally ineffective with Class I soils.

E. Connections:

1. Where required by actual field conditions, as directed by the Engineer, connections to existing structures, and existing line connections shall be made at no additional cost to the Owner.

2. Connections to Existing Structures: Existing structures are defined to be manholes, pump station wet wells, etc. An opening of sufficient size shall be cut to permit the end of the new pipe to be installed flush with the inner face of the existing masonry. Any portion of an existing structure that is damaged shall be repaired or replaced at the Contractor's expense.

3. Connections to Existing Lines: The Contractor will be required to locate by excavation existing sewer mains which are to be connected to the new main sufficiently in advance to coordinate the existing lines with planned lines and grades of new construction. These lines shall be connected to the new lines as shown on the drawings or as directed by the Engineer. The existing and new lines shall be joined in a neat and workmanlike manner. Wherein, in the opinion of the Engineer, a satisfactory joint cannot be made by use of a standard fitting, a concrete collar connection shall be installed.

F. Alignment and Grade:

1. Unless otherwise shown on the drawings, all gravity sewer pipe shall be laid straight between changes in alignment and at a uniform grade between changes in grade. All lines shall be laid so that each section between manholes will lamp.

2. The Contractor shall establish construction line and grade by the proper use of laser equipment.

G. Laser Equipment:

1. The laser equipment used shall be specifically designed for use in the construction of sewers to line and grade. The laser shall be rigidly mounted. with two point suspension, to its support platforms. The laser aligning method selected must be shown to have worked satisfactorily on at least three similar projects within the last two years. The laser shall be operated by manufacturer trained competent persons. Proof and demonstration of such training shall be required. The laser equipment used shall be as manufactured by Laser Alignment, Inc., Spectrophysics, Construction Laser Systems, AGL, or equal.

H. Service Connections:

1. Service connections shall be provided from the sewer main to the points as shown on the drawings or as directed by the Engineer.

2. The connection to the main may be accomplished by either installing an outlet wye or tee. Tees or wyes shall be factory molded fittings and of like material of the sewer main.

3. The service connection shall be installed in accordance with the details shown in the plans.

4. The joint material used for the house service outlet facilities shall be completely waterproof and shall be capable of withstanding any condition of stress or strain likely to be encountered in normal sanitary sewer construction or maintenance. Concrete encasement will not be considered waterproof and will not be an acceptable joint material.

3.05 FORCE MAIN SEWER INSTALLATION (SEE SECTION 02538) - N/A

3.06 SEPARATION OF WATER MAINS, SANITARY SEWERS AND COMBINED SEWERS

A. Parallel Installation:

1. Water mains shall be laid at least ten (10) feet horizontally from any existing or proposed sewer. The distance shall be measured edge to edge.

2. If specifically approved by IEPA installation of the water main closer to a sewer may be allowed, provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer and on either case, at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer.

3. In areas where the recommended separations cannot be obtained, either the waterline or the sewer line shall be constructed of mechanical joint pipe or cased in a continuous casing.

B. Crossings:

1. Water mains crossing sewers shall be laid to provide a minimum vertical clear distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer.

2. A full length of water pipe shall be located so both joints will be as far from the sewer as possible but in no case less than ten feet. Special structural support for the water and sewer pipes may be required.

3. In areas where the recommended separations cannot be obtained either the waterline or the sewer line shall be constructed of mechanical joint pipe or cased in a continuous casing that extends no less than ten (10) feet on both sides of the crossing.

C. Exception:

1. Any variance from the specified separation distances in paragraphs A and B must be submitted to IEPA for approval.

D. Force Mains:

1. There shall be at least a ten (10) foot horizontal separation between water mains and sanitary sewer force mains and they shall be in separate trenches.

2. In areas where these separations cannot be obtained, either the waterline or the sewer line shall be cased in a continuous casing.

E. Sewer Manholes:

1. No waterline shall be located closer than ten (10) feet to any part of a sanitary or combined sewer manhole.

F. Disposal Facilities:

1. No waterline shall be located closer than 25 feet to any on-site wastewater disposal facility, agricultural waste disposal facility, or landfill.

3.07 GRAVITY SEWER ACCEPTANCE TEST

A. Upon completion of the sewers, acceptance tests will be conducted by the Contractor in the presence of the Engineer to determine the acceptability of the sewers. The testing schedule shall be submitted to the Engineer by the Contractor prior to testing. The Contractor shall furnish suitable test equipment, materials and manpower to conduct the test. The Contractor shall cooperate fully with the Engineer for the inspection and testing of the completed work.

B. A low pressure air test will be conducted after backfilling and before replacing pavement.

1. Air Testing of Sewers - After completing backfill of a section of wastewater line, the Contractor shall, at his expense, conduct a line acceptance test using low pressure air. The test shall be performed using the below stated equipment according to stated procedures and under the supervision of the Engineer. Test procedures shall be in accordance with applicable provision of ANSI/ASTM C828.

2. Equipment:

a) Pneumatic plugs: Cherne Air Lock Equipment, as manufactured by Cherne Industrial, Inc. of Edina, Minnesota; United Survey Products, Inc., Cleveland, Ohio; or approved equal. Equipment used shall meet the following minimum requirements:

(i) Shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.

(ii) Shall resist internal test pressures without requiring external bracing or blocking.

b) All hoses shall be of sufficient length that pressurizing and testing operations can be completed outside of the manhole.

c) Pressure gauges shall be 2" minimum with pressure increments indicated every 0.5 psi, starting at 0.5 psi.

3. After the pipe has been backfilled, the inside of the pipe shall be cleaned and the plugs shall be placed in the line at each manhole and inflated to twenty-five (25) psig. Low pressure air shall be introduced into this sealed line until the internal air pressure reaches four (4) psig greater than the

average back pressure of any ground water that may be over the pipe. At least two (2) minutes shall be allowed for the air pressure to stabilize.

4. After the stabilization period (3.5 psig minimum pressure in the pipe), the air hose from air supply shall be disconnected. That portion of the line being tested shall be termed "Acceptable" if the time required in minutes for the pressure to decrease by one (1) psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time shown for the given diameters in the table below (minimum testing time shall not be less than 2 minutes):

a)

Diameter of Pipe in Inches	T (Time) Min./100 Feet
4	0.3
6	0.7
8	1.2
10	1.5
12	1.8
15	2.1
18	2.4
21	3.0
24	3.6

C. There shall be no substitute for good construction. The replacement of any pipes, pipe or fraction thereof shall require the end connections to be made with factory manufactured pieces having flexible gasketed joints to fit intended use. The use of half bell pipe and/or concrete collar will not be acceptable. Test shall be repeated as often as necessary until the installation meets the requirements of the acceptance test.

D. All sewer pipes shall be flushed to remove any debris, sand or grit from the completed sewers prior to being placed in service. The Contractor shall flush and pump or remove all water from the flushing process.

E. Each section of the sewer line between manholes is required to be straight and uniformly graded. Each section will be lamped in the presence of the Engineer.

1. Using a high intensity lamp or mirrors, light shall be directed through every pipe section.

2. A "target" shall be held by the engineer at the opposite end of the pipe section. The target shall clearly depict a circle which is equal to 80% of the inside diameter of the pipe.

3. The section of pipe shall pass if the light appearing on the target is equal to or greater than the size on the circle.

F. Deflection testing shall be done on all flexible sewer pipe. Deflection testing shall be done on 100% of the flexible sewer pipe installed in the project. The sewer line shall be tested for excess deflection by pulling a mandrel through the pipe from manhole to manhole without the aid of a mechanical pulling device.

1. Deflection (mandrel) testing shall not occur until the pipe to be tested has been backfill for at least thirty (30) days.

2. The outside diameter of the test mandrel shall be ninety-five (95) percent of the original inside diameter of the pipe being tested. The mandrel shall be commercially made and shall clearly indicate the intended pipe it is designed to test.

3. If deflection is more than five (5) percent of the original diameter, the Contractor shall excavate to the point of excess deflection and carefully compact around the point where the excess deflection was found. This length of pipeline shall be re-tested after a period of thirty (30) days after backfilling. However, should, after the initial testing, the pipe fail to return to the original size (the inner diameter), the pipe shall be replaced.

G. If the installation fails to meet these requirements, the Contractor shall, at his own expense, repair or replace all defective materials and/or workmanship and re-test until the installation meets these requirements.

3.08 CONSTRUCTION NEAR EXISTING UTILITIES

A. The Contractor shall maintain in operating condition, all active utilities, sewers, gutters and other drains encountered in the new sewer installation.

END OF SECTION 02537

DIVISION 2 – SITE CONSTRUCTION

SECTION 02538 - SEWAGE FORCE MAINS

1.00 GENERAL

A. The Contractor shall furnish and install all pipe and appurtenances of sizes and materials shown on the drawings and specified herein.

B. Applicable Sections: 02080 Utility Materials, 02315 Excavating, Filling and Grading, and 02374 Fertilizing, Seeding and Mulching

1.01 QUALITY ASSURANCE:

A. Work shall conform to all local building codes.

B. All codes referred to are those listed by:

1. American Society for Testing Materials (ASTM).
2. America Water Works Association (AWWA)
3. American Standards Association (ASA).
4. Commercial Standards (CS).
5. American Association of State Highway & Transportation Official (AASHTO).
6. Federal Specifications.

Codes and standards referred to above shall be the current edition which is being used at the time of bid opening.

C. All materials to be used in this work will be inspected before being placed and all rejected material must be removed immediately and not used in work under this Contract. Any material placed without inspection shall be removed and replaced with new materials if so directed by the Engineer.

D. The Contractor shall pay for all the tests required by the specifications. Such tests shall be performed by the Contractor or a competent independent laboratory approved by the Engineer on test specimens selected by the Contractor under the direct supervision of the Engineer. Copies of all the test results shall be submitted to the Engineer directly from the testing laboratory.

2.00 PRODUCTS

2.01 SEE SECTION 02080 UTILITY MATERIALS FOR MATERIAL SPECIFICATIONS

2.02 GRANULAR TRENCH BACKFILL

A. Granular trench backfill where called for on the drawings shall consist of sand, stones and stone screenings or chat and shall be reasonably free from an excess of soft and unsound particles and other objectionable matter. The aggregate shall be uniformly graded and shall conform to the following limits:

Sieve Size	Percent Passing
1"	100%
1/2"	60-90%
No. 4	40-60%
No. 40	15-35%

3.00 EXECUTION

3.01 SHIPPING AND HANDLING

A. Handle pipe in a manner to insure installation in sound, undamaged condition using proper equipment, tools and methods.

B. Pipe damaged during transporting or handling which, in the opinion of the Inspector, cannot be satisfactorily repaired, will be rejected.

3.02 CLEANING

A. Thoroughly clean interior of all pipe, fittings and joints before installation.

B. Exclude foreign matter during installation by providing temporary covers over end of pipe, if necessary.

C. Do not place tools, clothing or materials at any time in pipe.

D. Visually inspect, remove all articles in pipe, brush or flush clean immediately prior to final fitting of system.

3.03 INSTALLATION OF BURIED PIPING

A. Proper implements, tools and facilities satisfactory to the Inspector, shall be provided and used by the Contractor for the safe and convenient execution of the work. All pipe, fittings and valves shall be carefully lowered in the trench piece by piece by means of a derrick, ropes or other suitable tools or equipment in such a manner as to prevent damage to piping materials and protective coatings and linings. Under no circumstances shall materials be dropped or dumped into the trench.

B. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. If the pipe laying crew cannot install the pipe in place without getting earth into it, the Contractor will be required before lowering the pipe into the trench, to place a heavy, tightly woven bag over each end of the pipe to the left in place until the connection is made to the adjacent pipe. During laying operations, no debris, tools, clothing or other material shall be placed in the pipe. At times when pipe laying is not in progress, the open ends of pipe must be closed by a watertight plug or other suitable means to seal the open end of the pipe.

C. Wherever possible, pipe shall be laid with bell ends facing in the direction of the laying. Wherever it is necessary to deflect the pipe from a straight line either in the vertical or horizontal plane to avoid obstructions, the angle of the deflection allowed shall not exceed that recommended by the manufacturer of the pipe. The use of fittings to make vertical bends shall be subject to the approval of the Inspector.

D. Preparatory to making pipe joints, the joint material on both the bell and spigot ends shall be thoroughly cleaned and coated with the proper lubricant or cement to facilitate assembly. The spigot end shall be inserted in the bell and pressure applied until the pipe is properly sealed.

E. No pipe shall be laid in water or in trench conditions unsuitable for laying pipe in conformance with these specifications.

F. Trench should be sufficiently wide to permit tamping around pipe. Bottom should be smooth and cleared of stones or protruding hard objects. Pipe should be supported over its entire length.

G. Thrust blocks as indicated shall be installed at all elbows, tees, reducers, valves, caps, etc.

H. All piping is to have a minimum of 48" of cover over the pipe, unless otherwise specified.

I. Backfill operations shall commence immediately after laying pipe in trench upon authorization of Inspector.

J. The Contractor shall provide adequate equipment to eliminate "skips" during the trenching operation. Skips will not be permitted unless approved by the Engineer or Inspector.

K. The Contractor shall furnish and install a continuous #12 AWG solid copper locator wire with green THHN insulation in trench with all pipelines prior to backfilling operations. This copper wire shall be looped up into all

valve boxes and air release valve boxes. All splices in the locator wire shall be made with 3M direct bury splice kits, or approved equal. Splices in the locator wire shall be kept to a minimum number as reasonably possible.

L. The general alignment of the new force main is shown on the drawings. Minimum covers shall be 48" to top of pipe with the only exceptions being where tie-ins are to existing mains less than 48" deep. Where the new force main conflicts with another pipeline or structure, the new main shall pass beneath such pipeline or structure.

3.04 BACKFILL AND FILL

A. Place acceptable fill material in layers to required subgrade elevations, for each area classification as listed below:

1. In trenches and excavations, use satisfactory excavated or borrow material provided no rocks, hard clay, frozen earth, broken pavement, tree limbs, heavy vegetation, debris, etc. are contained therein.

2. Under grassed areas, use satisfactory excavated or borrow material as specified for trenched areas.

3. Under walks and pavements, use crushed rock material as specified for granular trench backfill.

B. Placement and Compaction:

1. Unimproved areas, cropland, parks, grassed areas, etc. shall be backfilled with previously excavated soil, free of frozen material, stones, broken pavement, tree limbs, heavy vegetation, debris, etc. Placement may be by dragline, bulldozer, front-end loader or other suitable equipment. Depositing in layers or tamping will not be required. Sufficient surplus material shall be neatly rounded over the trench to compensate for settlement.

2. Aggregate surface streets, alleys, driveways and parking areas shall be backfilled with granular trench backfill.

   a) Granular trench backfill shall be placed above the initial backfill and extending up to existing grade. It is the intent to backfill all street and driveway crossings and areas where new waterlines and new sewerlines will be under the street roadbed with granular trench backfill. The cost of these aggregates and their installation shall be incidental to the cost per lineal feet of water pipe. Granular trench backfill shall be compacted to 95% standard proctor density.

3. Rigid surfacing shall be backfilled with granular trench backfill placed in layers not to exceed 6" and carefully compacted to 95% Standard Proctor Density (ASTM D698). The disturbed surfacing shall be resurfaced with materials and thicknesses equal to the existing surface.

3.05 SEPARATION OF WATER MAINS, SANITARY SEWERS AND COMBINED SEWERS

A. Parallel Installation:

1. Water mains shall be laid at least ten feet horizontally from any existing or proposed sewer. The distance shall be measured edge to edge.

2. If specifically approved by IEPA installation of the water main closer to a sewer may be allowed, provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer and on either case, at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer.

3. In areas where the recommended separations cannot be obtained, either the waterline or the sewer line shall be constructed of mechanical joint pipe or cased in a continuous casing.

B. Crossings:

1. Water mains crossing sewers shall be laid to provide a minimum vertical clear distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer.

2. A full length of water pipe shall be located so both joints will be as far from the sewer as possible but in no case less than ten feet. Special structural support for the water and sewer pipes may be required.

3. In areas where the recommended separations cannot be obtained either the waterline or the sewer line shall be constructed of mechanical joint pipe or cased in a continuous casing that extends no less than ten feet on both sides of the crossing.

C. Exception:

1. Any variance from the specified separation distances in paragraphs A and B must be submitted to IEPA for approval.

D. Force Mains:

1. There shall be at least a ten-foot horizontal separation between water mains and sanitary sewer force mains and they shall be in separate trenches.

2. In areas where these separations cannot be obtained, either the waterline or the sewer line shall be cased in a continuous casing.

E. Sewer Manholes:

1. No waterline shall be located closer than ten feet to any part of a sanitary or combined sewer manhole.

F. Disposal Facilities:

1. No waterline shall be located closer than 25 feet to any on-site wastewater disposal facility, agricultural waste disposal facility, or landfill.

3.06 PRESSURE AND LEAKAGE TESTS

A. After the pipe has been installed and backfilled as specified, all newly laid pipe shall be subjected to the hydrostatic pressure of 1.5 times the working pressure or rated pressure of the pipe, whichever is less, with a minimum pressure of 100 psi. The duration of each pressure test shall be at least one (1) hour.

B. All tests shall be made in the presence of the Owner or his authorized representative. The Contractor shall notify the Inspector at least twenty-four (24) hours before any work is to be tested.

C. All connections to piping systems shall be completed prior to testing unless otherwise authorized by the Engineer.

D. All pipe shall be slowly filled with water and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer. The pump, pipe connections and all necessary apparatus, including gauges, shall be furnished by the Contractor. The Contractor will furnish the gauges for the test and will make all taps into the pipe for conducting the tests.

E. Before applying the specified test pressure, all air shall be expelled from the pipe. If blowoffs are not available at necessary locations, the Contractor shall make the taps at the necessary locations before the test is made and insert the plugs after the test has been completed.

F. In the event that the pressure test indicates leakage, a leakage test shall be conducted as follows:

1. The Contractor shall furnish the gauge and measuring device for the leakage test, as well as the pump, pipe, connections and all other necessary apparatus, and shall furnish all necessary labor to conduct the test. The duration of each leakage test shall be one hour, and during the test, the piping shall be subjected to a hydrostatic pressure of 1.5 times the working pressure or rated pressure of the pipe, whichever is less, with a minimum pressure of 100 psi. No pipe installation will be accepted until the leakage is less than ten (10) gallons per mile of pipe per inch diameter per 24 hours. Should any

tests of pipe laid disclose leakage greater than that specified, the Contractor shall, at his own expense, locate and repair the defective joints until the leakage is within the specified allowance.

G. The pressure and leakage tests are only an indication to the Owner that the force main may be fit for use at the time the tests were performed. In no way does the pressure or leakage test relieve the Contractor of his responsibility under the terms of the contract agreement.

H. The Contractor shall be responsible for all arrangements and costs for all water and power used during filling and testing of the force main until final acceptance by Owner.

END OF SECTION 02538

DIVISION 2 - SITE CONSTRUCTION

SECTION 02722 - AGGREGATE BASE COURSE / AGGREGATE SURFACE COURSE

1.00 GENERAL

1.01 DESCRIPTION OF WORK

A. Work under this section consists of furnishing and placing one or more courses of crushed stone base or surface course aggregate on prepared subgrade.

B. Construction of aggregate base and/or surface course shall conform to typical sections, lines, grades, and thicknesses as shown on the drawings. Materials and construction methods shall conform to Section 402 of the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction (Latest Edition).

C. Applicable Sections 02315 Excavating, Filling, and Grading; 02230 Site Clearing.

Basis of Payment shall be lump sum for chip seal access road modifications and parking areas.

END OF SECTION 02722

DIVISION 2 – SITE IMPROVEMENTS

SECTION 02744 - CHIP SEAL

1.00 GENERAL

This scope of work shall consist of the application of prime coat, bituminous cover and seal coat along with cover and seal coat aggregates, in accordance with Section 403 of the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction with the following exception:

Cover and seal coat aggregates shall be gravel. Crushed stone will not be allowed. All other requirements shall apply.

Basis of payment shall be lump sum for chip seal access road modifications and parking areas.

END OF SECTION 02744

DIVISION 2 – SITE CONSTRUCTION

SECTION 02775 - WALKS AND CURBS

1.00 GENERAL

A. The Contractor shall furnish all labor, materials, tools, equipment and services necessary and incidental to complete all concrete walks and curbs.

B. All sidewalk and curbs removed on this project shall be replaced with new sidewalk and curbs of the same width and thickness as the original or as shown on the plans.

2.00 PRODUCTS

A. Concrete for walks and curbs shall comply with ADA requirements.

3.00 EXECUTION

A. All concrete walks and curbs shall be constructed in accordance with this specification.

B. Slopes: Provide 1/4" per foot crown or cross slope unless indicated otherwise. Make adjustments in slopes at intersections as necessary or directed to provide proper drainage.

C. Finish: Tamp and screen the concrete true to grade and section, bring sufficient mortar to the surface for finishing and give a wood or carpet float finish, provided that where the grade exceeds 6% the surface shall be given a belted or stiff broomed finish. Round all edges including those along expansion joints and grooves to a 1/4" radius.

D. Expansion Joints: Provide 1/2" transverse expansion joints, with premolded filler, not more than 24' apart, and also at walk intersection walk abutments, buildings, platforms or other fixed structures. Expansion joints shall be at right angles to the slab and extend the full depth thereof. The premolded filler shall extend to within 1/4" of the surface.

E. Grooves in Walks: Between expansion joints, cut grooves 1/8" to 1/4" wide and at least 1" deep with transverse grooves with a spacing approximately equal to the walk width, but not less than 4'.

F. Concrete curbs shall be constructed as detailed on the drawings.

END OF SECTION 02775

DIVISION 2 – SITE CONSTRUCTION

SECTION 02821 - CHAIN-LINK FENCING

Clarification:
Chain link fencing shall be comprised of 6' high fabric as detailed in the Specifications. per Add # 1

1.00 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. The Contractor shall furnish, install and place in satisfactory operating condition the chain-link fence, gates and appurtenances as shown on the drawings and described in the specifications.

B. This section covers the Chain-Link Fencing including:

1. Fabric
2. Intermediate Posts
3. Terminal Posts
4. Top and Brace Rails
5. Tension Wire
6. Fittings and Hardware
7. Barbed Wire
8. Gates and Gate Posts

C. Related sections include the following:

1. 02230 Site Clearing
2. 02315 Excavating, Filling and Grading

1.03 SUBMITTALS

A. Product Data: Include the following:

1. Product literature
2. Manuals
3. Complete product description
4. Affidavits of compliance with referenced standards and codes.
5. Manufacturer's warranty
6. A list of all deviations from drawings and specifications.

B. Shop Drawings: All shop drawing submittals shall be in accordance with the General Conditions and Division 1 and include the following:

1. Dimensions and required clearances
2. Weights and forces
3. Layout for all material including installation details

C. Field Test Reports: **Not applicable**

1.04 QUALITY ASSURANCE

A. The Contract Documents represent the minimum acceptable standards for materials specified in this section on this project. All materials shall conform fully in every respect to the requirements of the respective parts and sections of the drawings and specifications. If not named, the material which is a "standard product" with that manufacturer shall be modified, redesigned from the standard mode and shall be furnished with special features, accessories, materials of construction or finishes as may

be necessary to conform to the quality mandated by the technical and performance requirements of the specification.

B. Reference Standards: Comply with all applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. Occupational Safety and Health Act (OSHA)
2. American Society of Testing and Materials (ASTM)
3. American Society of Civil Engineers (ASCE)
4. American National Standards Institute (ANSI)

1.05 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare all equipment according to the following:

1. Ensure that all the material is protected.
2. Package all the material to protect from damage while in transport, loading, and unloading.

B. Storage:

1. Carefully prepare for storage and label all materials after they have been inspected.
2. Store materials to permit easy access for inspection and identification. Support all material off of the ground, if necessary, and protect steel members and package material from corrosion and deterioration as per manufacturer's instructions.

C. Handling: Handle all material as per manufacturer's instructions.

D. Inspect all materials against reviewed shop drawings at the time of delivery.

E. Materials damaged or not meeting the requirements of the reviewed shop drawings shall be immediately returned for replacement or repair.

1.06 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Engineer not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Engineer's written permission.

1.08 COORDINATION

A. Coordinate Work on this section with interfacing and adjoining Work for proper sequencing of each installation.

2.00 PRODUCTS

2.01 GENERAL

A. The chain-link fencing shall be comprised of 6' high fabric, intermediate posts, top and brace rails, tension wire, barbed wire, ground rods, fittings and hardware, and gates. The fence shall have 45 Degree angle extension arms slotted to carry three (3) evenly spaced strands of barbed wire.

2.02 FABRIC

A. The wire fabric shall consist of individual pickets helically wound and interwoven in the form of a continuous chain-link fabric without knots or ties except knuckling or twisting and barbing at the ends of pickets and in the selvage of the fabric only. The fabric shall be steel wire in the form of approximately uniform square mesh, having parallel sides and horizontal and vertical diagonals of approximately uniform dimensions. The mesh size shall be 2 inches measured in either direction as

the minimum clear distance between the wires forming the parallel sides of the mesh. A tolerance of plus or minus 1/8" will be permitted. The fabric height shall be considered as the overall dimension from the ends of the barbs or knuckles and measured without tension applied. A variation in height of plus or minus one (1) inch will be permitted.

B. The size of the wire constituting the fabric shall be a minimum of 9 gauge (0.148 inch nominal diameter) and shall have a nominal tensile strength of 80,000 psi based on the coated wire diameter.

C. The wire fabric shall be galvanized conforming to the requirements of ASTM A-392, Class II.

2.03 INTERMEDIATE POSTS

A. The intermediate posts shall be C-section roll formed from steel conforming to ASTM A-570, Grade 45, 2.25" x 1.70" with a minimum theoretical bending strength of 316 pounds under a 6' cantilever load; or 2 3/8 inch outside diameter plane end SS-40 pipe weighing 3.12 pounds per lineal foot; or 2.00 inch outside diameter Schedule 40 steel pipe weighing 2.72 pounds per lineal foot.

B. The intermediate posts shall be galvanized with 2 ounce zinc coating per square foot of surface area conforming to ASTM A-123 or SS-40 pipe.

C. The intermediate posts shall be of sufficient length to provide for a minimum of 30 inches of bury and extend to the top of the fabric.

D. Line post shall be installed in a uniform manner with spacing not to exceed 8'.

2.04 TERMINAL POSTS

A. All the end, corner, and pull posts shall be rolled formed section 3.5" x 3.5" with a minimum theoretical bending strength of 486 lbs. under a 6' cantilever load or 2.50" outside diameter Schedule 40 steel pipe weighing 3.65 lbs. per linear foot; or 2.875" O.D. plain end SS-40 pipe, 4.64 lbs. per foot.

B. The terminal posts shall be galvanized with a 2 ounce zinc coating per square foot of surface area conforming to ASTM A-123 or SS-40 pipe.

C. The terminal posts shall be of sufficient length to provide for a minimum of 3' of bury and extend to the top of the fabric.

D. Terminal posts shall be placed where fence line has a change in direction of 15 degrees or more, but not at intervals greater than 660 feet. They shall be installed in accordance with the same requirements of a corner post.

2.05 TOP AND BRACE RAILS

A. The top and brace rails shall be roll formed sections of 1.625" x 1.625" 35,000 psi yield strength channel shaped rail with a minimum theoretical bending strength of 192 lbs. on a 8' span midpoint load or 1.625 outside diameter Schedule 40 steel pipe weighing 2.27 lbs. per linear foot or 1 5/8" O.D. plain end SS-40 pipe, 1.84 lbs. per foot.

B. The rails shall be galvanized with a 2 ounce zinc coating per square foot of surface area conforming to ASTM A-123 or SS-40 pipe and shall be in lengths of not less than 18'.

C. The maximum length for the top rail shall be 24' between couplings.

D. Top rail couplings shall be not less than 6" long and shall allow for expansion and contraction of the rail. OPE seam sleeves shall not be permitted.

2.06 TENSION WIRE

A. The tension wire shall be 7 gauge steel, coil-spring Class III wire, conforming to ASTM A-824.

B. The tension wire shall be galvanized in accordance with the requirements of ASTM A-392 Class II.

2.07 FITTINGS AND HARDWARE

A. All the fittings shall be pressed steel or malleable iron. The wire ties shall be a minimum of 9 gauge aluminum wire. The tension bar bands shall be of a suitable size steel bevel stock.

B. All the fittings and hardware shall be galvanized in accordance with ASTM A-121 or A-123 or A-153.

2.08 BARBED WIRE

A. The barbed wire shall be double strand twisted 12-1/2 gauge steel wire with 14 gauge 4 point barbs spaced on approximately 5-inch centers, conforming to ASTM A-121 Class III Coating, or the barbed wire shall be aluminum coated conforming to the requirements of ASTM A-585, Type I, with 5" barb spacing.

2.09 GATES

A. The gates shall be constructed with frames of the same material as specified for the rails and fabric as specified for fabric. Aluminum frame members as indicated on the drawings may be acceptable upon specific authorization by the Engineer during shop drawing review. The frames shall be fastened together by welding or clamps and braces. Each gate panel shall be cross braced with a minimum of two (2) 3/8-inch adjustable truss rods. The gates shall be equipped with hardware of suitable design and strength to provide structural integrity and satisfactory operation. The gates shall have a latch and locking attachment. The gates, including all welds and hardware, shall be coated as specified for the components of its construction. Gate stops shall be included for all gates 6' and over. Gate stops shall be included for all gates 6' and over.

2.10 GATE POSTS

A. Gate post shall be in accordance with ASTM F-900.

B. Gate post for opens of 4' or less, shall be supported by 2.875" post with a steel weight of 4.64 lbs/ft set in a concrete footing with minimum dimensions of: 12" diameter and 36" depth.

C. Gate post for gates with a length of 6' to 12', shall be supported by 3.000" post with a steel weight of 5.79 lbs/ft set in a concrete footing with minimum dimensions of 14" diameter and 40" depth.

D. Gate post for gates with a length of over 12' to 18' shall be supported by a 6.625" post with a steel weight of 18.02 lbs/ft, set in a concrete footing with minimum dimensions of 18" diameter and 42" depth.

E. Gate post for gates with a length over 18' to 24' shall be supported by a 8.625" with a steel weight of 27.12 lbs/ft set in a concrete footing with minimum dimensions of 18" diameter and 42" depth.

2.11 GROUND RODS

A. Continuous fence shall be grounded at intervals not exceeding 100 feet in urban areas and 500 feet in rural areas. Except there shall be a ground rod not exceeding 100 feet from a gate in each section of the fence adjacent to gate.

B. Fence under a power line shall be grounded by a power line by three grounds, one directly under the crossing and one on each side, 25 to 50 feet away. A single ground shall be located directly under each telephone wire or cable crossing.

C. The counterpoise ground shall be used only where it is impossible to drive a ground rod because of an impervious earth structure.

D. The ground wire shall be connected to the fabric and the ground rod by a mechanical clamp of cast bronze body and bronze or stainless steel bolts and washers. When a tension wire is required, the

bottom connection of the ground wire shall be made to the tension wire.

3.00 EXECUTION

3.01 INSTALLATION

A. Install all material specified in this section as indicated on the contract drawings and in accordance with the manufacturer's instructions.

B. The Contractor shall fill, cut or trench where necessary to produce a smooth and uniform, ground surface so the bottom of the fabric is not more than 2 inches above the finished ground line. Posts shall be set plumb, true to line and grade in concrete footings, and shall be located as shown on the Drawings or as directed by the Engineer. Footing shall be of concrete of a commercial mixture, with a uniform thickness around the post. Fabric shall not be attached to posts until the concrete in the footings is at least five (5) days old.

C. Fabric shall be attached to end, corner, gate, and pull posts by weaving fabric into integral lock loops formed in the posts on the roll formed posts and by stretcher bars and stretcher bar bands spaced 12+ inches on centers on the tubular posts. The top rails and line posts shall be fastened with wire ties with a maximum spacing of 24 inches on centers. The tension wire shall be fastened with 9 gauge hog rings a maximum of 24 inches on centers to the fabric. All the fabric shall be pulled taut by approved hand-powered mechanical means before it is attached to line posts or top rails. Top rails shall be continuous from terminal post, connected with outside sleeve couplings, either screw or self-centering type, every fifth one of which in any continuous length shall be a slip coupling with an enclosed compression spring.

D. The gate, complete with hinges, latches, braces, stops and locking device, shall be installed at locations shown on the Drawings. Gates shall have 180 degree opening swing with stops. The gates shall be to the dimensions and located as shown on the Drawings.

E. All end corner and pull posts shall be embedded in concrete 14" in diameter to a depth of 3' below grade. Intermediate posts shall be embedded in concrete 12" in diameter to a depth of 30 inches below the surface. Braces shall be placed at all corner and gate posts in the fence and shall extend to the first line post. Concrete posts footings per CLFMI and ASLM-AF14 recommendations. All concrete footings shall be 4" deeper than post embedment. Braces shall be attached midway of the fence height.

F. All posts shall have a maximum spacing of 8 feet.

G. The top rail may pass through line post tops, but shall be secured at all gate and corner posts.

H. The finished fence shall be in proper alignment with posts plumb and chain-link fabric pulled taut. Care shall be exercised to equalize the tension on the full width of the fabric. Wire fabric shall be securely fastened to the posts. Gate shall operate freely and shall be installed so the keeper and gate latch operate freely.

3.02 WARRANTY

A. Warranty all parts to be free from defects in material and workmanship for a period of one year after final acceptance by the owner. Furnish and install replacement parts found to be defective within the defined one year warranty period.

END OF SECTION 02821

DIVISION 3 - CONCRETE

SECTION 03050 - PORTLAND CEMENT CONCRETE

1.00 GENERAL

A. This section of the specifications covers the materials, methods of construction, and requirements necessary to complete the Portland Cement Concrete work as indicated on the Drawings or as specified herein.

1.01 TESTING AGENCY

A. Inspection and testing will be performed by a firm approved by the Engineer and paid for by the Contractor.

B. Mix Design Submittals: Prior to beginning the work and within 14 days following the notice to proceed, the Contractor shall submit to the Engineer, for review, previous independent laboratory generated data detailing performance (measures of performance as defined below) of the proposed mix design. Contractor shall also provide certification that materials used and their proportions are to be essentially unchanged from the mixture for which the data was generated. If independent laboratory data is not available, the proposed mix design shall be checked by an independent laboratory acceptable to the Engineer. All costs related to such testing shall be paid for by the Contractor. Since laboratory trial batches require 35 calendar days to complete, the Contractor may consider testing more than one mix design for each class of concrete. Include the following information for each mix design:

1. Water/cement materials ratio
2. Slump as per ASTM C 143
3. Air content as per ASTM C 231 (pressure method), or ASTM C 173 (volumetric method)
4. Unit weight of concrete as per ASTM C 138
5. Compressive strength at 3, 7, and 28 days per ASTM C 39
6. Shrinkage (length change) as measured in accordance with Section 1.01 - Testing Agency, Paragraph C. - Shrinking Testing Procedure

C. Shrinkage Testing Procedure: Testing and reporting shall conform to the latest ASTM C 157-93 with the following modifications:

1. Wet cure specimens for a period of 7 days (including the period of time the specimens are in the mold). Wet cure may be achieved either through storage in a moist cabinet or room in accordance with ASTM C 511, or through storage in lime saturated water.
2. Slump of concrete for testing shall match job requirements and need not be limited to restrictions as stated in ASTM C 157 Section 7.4.
3. Report results in accordance with ASTM C 157 at 0, 7, 14, and 28 days of drying.

D. Test of cement and aggregates shall be performed to ensure conformance with specification requirements. Manufacturer's certification that cement materials meet specification requirements and results of manufacturer's own material tests will be acceptable in lieu of tests by inspection and testing firm. Aggregate testing shall be performed by independent inspection and testing firm, for compliance with ASTM C33, including limits for deleterious substances, grading and physical property requirements.

E. Field quality control tests are specified in Part 3 of this section.

1.02 REFERENCE STANDARDS

A. ACI 301 - Specification for Structural Concrete for Buildings.

B. ACI 340 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

C. ACI 305 - Recommended Practice for Hot Weather Concreting.

D. ACI 306 - Recommended Practice for Cold Weather Concreting.

E. ACI 318 - Building Code Requirements for Reinforced Concrete.

F. ASTM C33 - Concrete Aggregates.

G. ASTM C39 - Compressive Strength of Cylindrical Concrete Specimens.

H. ASTM C94 - Ready-Mixed Concrete.

I. ASTM C138 - Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.

J. ASTM C143 - Slump of Portland Cement Concrete.

K. ASTM C150 - Portland Cement.

L. ASTM C157-93 - Length Change of Hardened Hydraulic-Cement Mortar and Concrete.

M. ASTM C171 -Sheet Materials for Curing Concrete.

N. ASTM C173 - Air Content of Freshly Mixed Concrete (Volumetric Method).

O. ASTM C231 - Air Content of Freshly Mixed Concrete (Pressure Method).

P. ASTM C260 - Air Entraining Admixtures for Concrete.

Q. ASTM C309 - Liquid Membrane - Forming Compounds for Curing Concrete.

R. ASTM C494 - Chemical Admixtures for Concrete.

2.00 PRODUCTS

2.01 PORTLAND CEMENT

A. The Portland Cement shall conform to A.S.T.M. Specifications C-150, Type I, or A.S.T.M. Specification C-175, Type IA air entrained cement, if approved by the Engineer.

B. The portland cement used under this contract shall be a standard brand of portland cement which has been in practical use in public works and which has heretofore given satisfactory results. The cement when delivered to the site or at the location where the concrete is to be mixed, shall be stored so as to protect it from damage; and no damaged, partially set, or lumpy cement shall be used in the work and shall immediately be removed from the premises. The cement shall be manufactured by only one mill and used throughout the entire project. Brands of cement shall not be mixed.

2.02 FINE AGGREGATE

A. The fine aggregate shall consist of clean, natural sand of hard, strong, durable material, free from all foreign organic material or other injurious impurities conforming to A.S.T.M. C-33. The sand shall be graded to meet the following sieve analysis using the U.S. Standard sieve series, with all percentages determined by weight.

	SIEVE SIZE	PERCENT PASSING
1.		
2.	3/8 Inch	100
3.	No. 4	95-100
4.	No. 16	60-75
5.	No. 50	10-30
6.	No. 100	0-5

B. The fineness modulus of the fine aggregate shall not be less than 2.50 nor more than 3.00.

2.03 COARSE AGGREGATE

A. The coarse aggregate shall be clean washed and screened gravel or crushed limestone, having a specific gravity of not less than 2.56. The gravel shall be free from dust, loam, clay, alkali, or organic impurities, and free from thin porous, elongated, or laminated particles. A sample of the gravel when subjected to the sodium sulfate accelerated soundness test for freezing and thawing shall have a weighted average loss of not more than 15%. Crushed limestone aggregate shall consist of uncoated particles of sound, durable rock of uniform quality without an excess of flat, elongated, or laminated pieces.

B. The gravel or crushed limestone shall be graded to meet the following sieve analysis using the U.S. Standard Sieve Series, with all percentages determined by weight.

1.

	SIEVE SIZE	PERCENTAGE PASSING
a)	1 1/2 inch	100
b)	1 inch	95-100
c)	3/4 inch	70-85
d)	3/8 inch	20-40
e)	No. 4	0-5

C. The use of frozen aggregates will not be permitted. When the temperature of the air permits concreting to be carried on, the aggregates must be thawed out, thoroughly removing all frost before inclusion in the concrete mixture.

2.04 WATER

A. The water in mixing concrete shall be clean and free from injurious amounts of oil, acids, alkalis, salts, or organic matter. The water used shall be of potable quality.

2.05 ADMIXTURES

A. Should the Contractor desire to incorporate in the concrete mix an admixture to improve the workability of the concrete, the approval must be obtained from the Engineer. However, no additional payment will be made for the use of the admixture; the use of such admixture will be made at the Contractor's expense.

1. Air Entrainment: ASTM C260.

2. Chemical: ASTM C494, Type A - water reducing. Type B - retarding. Type C - accelerating. Type D - water reducing and retarding. Type E - water reducing and accelerating. Type F - high range water reducer. Type G - high range water reducing and retarding.

3. Shrinkage Reducing Admixture (SRA): Provide Eclipse™ Shrinkage Reducing Admixture as supplied by Grace Construction Products (or approved equal) at a rate of 1.5 gallons per cubic yard (liters per cubic meter).

4. Fibrous Reinforcing: Provide Grade MicroFiber7 as supplied by Grace Construction Products (or approved equal) at a dosage rate not less than 0.5 lb per cubic yard.

5. The use of calcium chloride in concrete is strictly prohibited.

2.06 PREMOLDED EXPANSION JOINT

A. The premolded expansion joint material shall be non-extruding resilient type conforming to ASTM designation D 1751.

B. The joint filler shall be full depth of concrete section and 2" thick unless shown otherwise.

2.07 REINFORCING STEEL

A. The reinforcing steel shall be rolled from new Billet-Steel Bars for Concrete Reinforcement A.S.T.M.-615 with deformations conforming to A.S.T.M.-305 and 60,000 psi minimum yield strength, A.S.T.M. A-432.

B. The reinforcing, when delivered, shall be protected from the weather. The reinforcing shall not be oiled or painted. Reinforcing with slight rust which can easily be removed with a wire brush may be used after removal of rust. All reinforcing steel unacceptable to the Engineer will be immediately removed from the job site.

C. Welded wire fabric shall conform to A.S.T.M. A-185 and shall be the size and gauge shown on the Drawings.

D. All bent bars shall be accurately cold bent to conform to the approved shop drawings.

E. All bars shall be tagged and bundled. Imperishable marking tags are to be used.

F. Metal accessories, including spacers, chairs, ties, and other devices necessary for properly assembling, placing and spacing and supporting all reinforcing in place, shall be provided.

G. Reinforcing steel shall be carefully handled so that it will not become bent or otherwise damaged, shall be stored on racks, skids or other supports which will keep the steel from contact with the ground.

2.08 CONCRETE ADHESIVE

A. Where indicated on the Drawings or requested by the Engineer, SIKA Corporation, SIKADUR 32, HI-MOD LPL, or equal adhesive shall be used.

2.09 SIDEWALK TEXTURING

A. Sidewalks shall be sprinkled with "Silicon Carbide" grains as manufactured by Carborundum Company or equal.

2.10 LIQUID MEMBRANE CURING COMPOUND

A. Liquid Membrane Curing Compound shall comply with ASTM C-309, Type 1, and AASHTO M-148.

B. Polyethylene Film: 4 mil thick, opaque ASTM C 171.

3.00 EXECUTION

3.01 CONCRETE

A. Mix concrete in accordance with ASTM C94.

B. Provide concrete of the following strength:

1. Compressive strength (28 day): 5000 psi

2. Entrained Air Content: As indicated in ACI 301, Table 3.4.1 or 7.5% +/- 1.5% with the Shrinkage Reducing Admixture.

3. Water Cement Ratio: Maximum 0.45.

4. Slump: 1 inch minimum, 3 inch maximum for footings and substructure walls; 4 inch maximum for slabs, beams, reinforced walls and columns. Loss of slump in pumping shall not exceed 1 1/2 inch.

C. Select proportions for normal weight concrete in accordance with ACI 301, Chapter 3, Section 3.9 or 3.10.

D. Admixtures shall be included with the mix design submittal and reviewed by the Engineer.

E. Use accelerating admixtures for use only in cold weather. Concrete techniques and placement requirements shall be in place under the application and reviewed by the Engineer. Calcium chloride or admixtures containing chlorides may not be used in the concrete.

F. Use retaining admixtures only in hot weather and shall follow hot weather concrete techniques to lower concrete temperature to an acceptable level. These techniques shall be reviewed by the Engineer.

G. Use air entrained concrete for all concrete exposed to the exterior.

3.02 MIXING

A. Ready Mix (Central Plant) concrete shall be used for all work on this project, provided the concrete conforms to the proportions and strengths as specified herein. Two speed mixer trucks shall be utilized for transit to the job site.

B. The concrete must be in place within one hour after water is added to the mix. A.S.T.M. Specifications for Ready Mix Concrete C-94 shall apply. The Central Mixing Plant shall be designated in writing to the Engineer for his approval one week prior to the usage of concrete on the job site.

3.03 COLD AND HOT WEATHER REQUIREMENTS

A. Cold weather concreting shall not be continued when the air temperature is below 45 degrees F, unless the following conditions are maintained:

1. Mixing water shall be heated to a maximum of 150 degrees F.

2. Aggregates shall be heated until free of all ice and frost.

3. The concrete temperature after mixing shall be between 50 degrees F and 70 degrees F if the air temperature is 25 degrees F to 45 degrees F.

4. After the concrete is placed, it shall be covered, protected and heated so as to maintain a minimum of 70 degrees F air temperature for the first 24 hours and 50 degrees F for the next six days.

5. Moist conditions shall be maintained during the heating period.

6. All covering, heating equipment, etc., shall be on hand and approved by the Engineer before any concrete is placed.

B. No concrete shall be placed on iced or frozen subgrade or when the air temperature is below 25 degrees F.

C. Hot weather concrete work will not be permitted on exposed surfaces while air temperature exceeds 100 degrees F. Cover and protect and cool as necessary to maintain the internal temperature of the concrete below 100 degrees F. Concrete delivered to the job site while in the Ready Mix truck shall maintain a temperature less than 85 degrees F.

3.04 CURING

A. Curing shall be accomplished by preventing loss of moisture, rapid temperature change, and mechanical injury or injury from rain or flowing water for a period of not less than 5 days when normal Portland Cement has been used. Curing shall be started as soon as free water has disappeared from the surface of the concrete after placing and finishing. Curing shall be accomplished by using any of the following methods or combination thereof, as approved by the Engineer.

B. Unformed surfaces shall be covered with approved fabric, mats, burlap, or with sand, and shall be kept continually wet, or be covered with waterproof paper or polyethylene sheeting, or be coated with liquid membrane. Where formed surfaces are cured in forms, the forms shall be kept continually wet or the top forms may be loosened, as directed or approved by the Engineer and water allowed to run down between the forms and concrete. If forms are removed before the end of the curing period, curing shall be continued as on unformed surfaces. Burlap shall be used only on surfaces which will be exposed in the finish work and shall be in two layers. Water shall be applied in a manner which will not damage the concrete, and shall be free from impurities which may damage or discolor the concrete.

C. Liquid membrane-forming curing compounds, when approved by the Engineer, shall be applied by power spraying equipment using a spray nozzle equipped with a wind guard. The compound shall be applied in a

two-coat, continuous operation at a coverage of not more than 200 square feet per gallon for each coat or as recommended by the manufacturer. The compound shall form a uniform, continuous, adherent film that will not check, crack or peel and shall be free from pinholes or other imperfections. Surfaces subject to heavy rainfall within 3 hours after application of compound shall be re-sprayed at the rate specified above. Surfaces coated with curing compound shall be kept free of foot and vehicle traffic or other abrasions during the curing period. Membrane curing compound shall not be used on surfaces that are to receive concrete, bituminous membrane waterproofing, resilient floor covering, nor surfaces that are to be painted.

D. Waterproof paper or polyethylene sheeting shall be placed to completely cover the concrete with enough overlap for secure anchorage around the edges. Adjoining sheets shall be lapped 6 inches and appropriately weighted, or sealed with tape or other approved means. Edge and lap anchorage shall be sufficient to prevent billowing or displacement by the wind. The sheeting material shall be no less than 4 mils thick and black in color for cold weather use and white or clear for hot weather.

E. To facilitate rubbing of concrete, or for other reasons, forms may be removed from vertical surfaces of thick sections 48 hours after concreting, with the approval of the Engineer. Extreme caution should be exercised to prevent injury of concrete surfaces and edges during form removal. Surfaces revealed by form removal before the 5 day curing period shall have one of the other curing methods applied as soon as possible after from stripping.

3.05 FORMS

A. The forms utilized for concrete shall be watertight, true to line and elevation, and rigidly braced so as not to be disturbed during the placement of concrete. If the forms develop any defects such as bulging, sagging, or showing signs of lateral displacement after the concrete has been placed, the concrete shall be removed and replaced correctly at the Contractor's expense. The inside of all forms shall be coated with a light, clear, paraffin based oil, which will not discolor or otherwise mar the concrete surface. The oil will be applied prior to erection of the forms; any reinforcing steel contaminated with form oil will be removed and replaced.

B. Forms for concrete surfaces which will be visible in the finished structure shall be lined with wooden sheets such as masonite or smooth plywood. The joints of this lining shall be neat and close. Lining damaged with hammer imprints shall not be used.

C. Removal of forms shall be restricted to the following minimum time requirements:

1.	Floor slab (structural):	120 hours
2.	Floor slab on grade:	48 hours
3.	Walls:	48 hours
4.	Beam bottom forms	7 days or develop at least 3,000 psi

D. The minimum times, shown above, shall be utilized unless specific instruction to increase this time period has been requested by the Engineer.

E. Form ties shall be of the removable end, permanently embedded body type and shall have sufficient strength, stiffness, and rigidity to support and maintain the form in proper position and alignment without the use of auxiliary spreaders. Ties shall also have water stop collars.

F. Chamfer strips shall be placed in forms to bevel all salient edges and corners and the top edges of walls. Unless otherwise noted, bevels shall be 3/4 inch wide and shall be cast in place. Chamfer edges shall be straight and level.

3.06 PLACING REINFORCEMENT

A. Reinforcement shall be accurately formed and positioned, and shall be maintained in proper position while the concrete is being placed and compacted. Unless otherwise shown on the Drawings, the details of fabrication shall conform to ACI 315 and 318. In case of conflict, ACI 318 shall govern.

B. Approval by the Construction Inspector is required at the completion of placing reinforcing steel prior to the placing of any concrete.

3.07 PLACING OF CONCRETE

A. The placing of concrete shall be accomplished by placing in one continuous operation between the limits of the work or between properly constructed and permissible construction joints.

B. The Contractor shall place no concrete until after inspection, by the Engineer, of forms, reinforcing, and embedded items. Place no concrete over water covered, muddy, frozen soil or dry soil or sub-base. Dry sub-base shall be sprinkled with water prior to the placement of concrete.

C. In preparation for the placing of concrete, all chips, and other construction debris and extraneous matter, shall be removed from the interior of the forms. Struts, stays and braces, serving temporarily to hold the forms in correct shape and alignment pending the placing of concrete in their locations, shall be removed when the concrete placing has reached an elevation rendering their services unnecessary. These temporary members shall be entirely removed from the forms and not buried in the concrete. Concrete shall be placed so as to avoid segregation of the materials and displacement of the reinforcement. The use of long troughs, chutes, and pipes for conveying concrete from the mixer to the forms shall be permitted only on written authorization from the Engineer. In case an inferior quality of concrete is produced by the use of such conveyors, the Engineer may order discontinuance of their use and the substitution of a satisfactory method of placing.

D. Concrete shall be conveyed to place of deposit by methods which prevent separation of materials. Hoppers, chutes, tubes, or pumping equipment shall be sized to insure a practically continuous flow of concrete to point of delivery without separation of materials.

E. The maximum free fall of concrete shall be less than six feet (6').

F. Concrete shall be placed in a continuous operation until the panel or section is completed. Concrete for walls, piers, and columns shall be placed in layers not to exceed eighteen inches (18") in depth. Layers shall be incorporated together by vibrating a minimum of three inches (3") into the previously placed layer.

G. During the placing of the concrete, it shall be compacted by mechanical vibration obtained by mechanical power operating within the mass of the concrete, supplemented by spading tools. Vibrators shall be of a type and design approved by the Engineer.

H. The intensity of vibration shall be such as to visibly affect a mass of concrete of 1 inch slump over a radius of at least 18 inches. The Contractor shall provide a sufficient number of vibrators to properly compact each batch immediately after it is placed in the forms. Vibration shall be manipulated so as to thoroughly work the concrete around the reinforcement and embedded fixtures and in the corners and angles of the forms. Vibration shall be applied at the point of deposit and in the areas of the freshly deposited concrete.

I. The vibrators shall be inserted and withdrawn out of the concrete slowly. The vibration shall be of sufficient duration and intensity to thoroughly compact the concrete, but shall not be continued so as to cause segregation of aggregate. Vibration shall not be continued at any one point to the extent that localized areas of grout are formed.

J. Vibrations shall not be applied directly or through the reinforcement to sections or layers of concrete which have hardened to the degree that the concrete ceases to be plastic under vibration. It shall not be used to make concrete flow in the forms over distances so great as to cause segregation, and vibrators shall not be used to transport concrete in the forms.

K. Vibration shall be supplemented by such spading as is necessary to ensure smooth surfaces and dense concrete along form surfaces and in corners and locations impossible to reach with the vibrators.

3.08 FINISHING

A. Finishing of the concrete shall be accomplished as follows:

1. Immediately after removing the forms, all fins or irregular projections shall be removed from all surfaces exposed above ground. On all surfaces the areas of cavities produced by form ties, holes, honeycombing, broken edges or corners, and other surface defects, shall be cleaned and carefully filled, pointed, and trowelled to a true uniform smooth surface with sand-cement mortar mixed in the proportions used in the grade of concrete being furnished. Defective concrete as determined by the Engineer shall be repaired by cutting out the unsatisfactory material and placing new concrete which

shall be secured with keys, dovetails or anchors. Concrete for patching shall be drier than the usual mixture and shall be thoroughly tamped into place.

2. All exposed concrete surfaces, that is, those surfaces which will be visible (except floor slabs and sidewalks) shall be finished in the following manner: Forms shall be removed from such surfaces as soon as structurally possible, as approved by the Engineer and all depressions or imperfections immediately patched as described above. The surface shall then be machine or hand-rubbed until the entire surface has a smooth, homogeneous pleasant-appearing finish of uniform texture and color. Any delay in patching or rubbing such surfaces shall be cause for rejection of the entire structure or for requiring the surfaces to be ground smooth and painted or coated with thoroseal as specified in 2.11 of this specification.

3. All surfaces to receive a decorative or protective coating shall be ground, rubbed and filled as necessary to provide a surface smooth enough to insure a good paint coverage.

4. No mortar wet cement shall be used in finishing except the mortar necessary to fill imperfections. Edging tools shall be used on all exposed top edges.

5. The top surface of walls where exposed shall receive a smooth trowelled finish. Where the top surface joins the sides, a 3/4 inch chamfer shall be provided. All floor slabs shall receive a steel trowel finish.

6. On pedestrian walks, before final troweling and brooming, and while concrete is still wet, apply Carborundum Company "Silicon Carbide" grains by sprinkling on at a rate of 1/4 pound per square foot and working grains with a wood float. Walks shall receive a light brush finish.

3.09 SAMPLES AND TEST

A. Concrete Control Tests: For strength tests of cylinders during work provide 3 cylinders for each 50 cu. yd. of concrete, a part thereof over 20 cu. yds. used on one days pour for each concrete class. Test 2 at 7 days; 2 at 28 days. Make and cure test cylinder per ASTM C31. Cure specimens under laboratory conditions except Engineer may require curing under field conditions when he considers that there is a possibility air temperature may fall below 40 degrees F. Test cylinders per ASTM C39.

B. Testing Questionable Concrete: In event cylinders indicate that concrete does not meet specified strength requirements, Engineer reserves right to order cores from hardened concrete secured and tested per ASTM C42, or order load tests per ACI 318, or both. Costs of such cores and tests shall be borne by Contractor. If tests indicate that concrete placed does not conform to drawings and specifications, Contractor shall take measures as directed by Engineer to correct deficiency without extra cost to Owner.

C. Slump Test: Test should occur at the beginning of the day, whenever questionable concrete is encountered and whenever test cylinders are taken.

D. Air Test: Test should occur whenever the air temperature changes, the aggregate grading changes and whenever test cylinders are taken.

E. Reinforcing Steel: With each shipment of steel, submit to Engineer three (3) copies of certified mill test covering tensile strength of samples from shipment.

3.10 SHOP DRAWINGS

A. Shop drawings shall be submitted in accordance with the General Conditions and General Requirements. The Contractor shall furnish certified mill tests for all bars and shall submit duplicate copies of the bar drawings and schedules for preliminary checking and copies for final approval as specified in the General Conditions and General Requirements. Bending details shall conform to the standards of the Reinforcing Steel Institute.

END OF SECTION 03050

DIVISION 4 - MASONRY

SECTION 04050 - BASIC MASONRY MATERIALS AND METHODS

1.00 GENERAL

A. The Contractor shall furnish all labor, materials and equipment necessary to complete all masonry work as shown on the drawings or as specified herein.

B. Applicable Section: 09900 Paints and Coatings

2.00 PRODUCTS

2.01 CEMENT

A. Cement, shall be Portland Cement conforming to ASTM Specification C-150, Type I, non-staining.

2.02 LIME

A. Lime shall be Quicklime for Structural Purposes conforming to ASTM Specification C-5 or Hydrated Lime for Masonry Purposes conforming to ASTM Specification C-207, Type S. The hydrated lime shall not contain air-entrainment additives.

2.03 SAND

A. Sand shall be Aggregate for Masonry Mortar conforming to ASTM Specification C-144.

2.04 WATER

A. Water shall be clean and free of deleterious substances.

2.05 MORTAR COLORS

A. Pure mineral mortar colors shall be used and in amounts as directed.

3.00 EXECUTION

3.01 MASONRY BLOCKS

A. All masonry walls shall be laid true and plumb. Each block shall be adjusted to its final position while the mortar is still in a plastic state. Any block that is disturbed after the mortar has set up shall be removed and re-laid with fresh mortar at the Contractor's expense.

B. Unless shown otherwise on the drawings, the walls shall be laid in uniformly straight courses with running bond.

C. Do job cutting with motor driven masonry saw. No open cells, cracked or chipped units will be permitted in exposed areas. Use no closers less than 8" long.

D. Mortar joints shall be uniformly straight, clean and thick, and tooled to produce a dense, slightly concave surface well bonded to the block. Unless otherwise specified or shown on the drawings, head and bed joints shall be 3/8" thick. Solidly bed each block in mortar with full mortar coverage. Use bond blocks as required.

3.02 HORIZONTAL REINFORCING

A. Unless specifically excluded by note on drawings, reinforce all masonry walls and partitions with continuous rows of reinforcing at 16" intervals. Run continuous throughout except at control and expansion joints.

3.03 FLASHINGS

A. Flashings, waterstops, control joints and expansion joints shall be installed as detailed.

3.04 SAMPLES

A. Prior to delivery of materials and preceding any work, submit 2 masonry blocks to Engineer for approval. The blocks must be accompanied by test results from an independent test lab certifying that the block meets ASTM C-90 Standards.

3.05 STORAGE OF MATERIALS

A. Store all masonry materials in a manner to prevent absorption of moisture and to prevent staining or other damage. Keep covered at all times protected from weather. Mortar materials shall be stored in weather tight enclosures.

3.06 PRECAUTIONS

A. Masonry shall not be laid when the ambient temperature is below 35 degrees f (+2 degrees C). Completed masonry work shall be protected from freezing for a minimum of 48 hours. No anti-freeze ingredients shall be incorporated into the mortar.

B. When work is not in progress, keep top of walls covered with waterproof coverings. When work is resumed, top surfaces of work shall be cleaned of all loose mortar.

C. Receive and build in all door and window frames, access panels, and other embedded items furnished by other trades.

3.07 CLEANING

A. At the conclusion of masonry work, Contractor shall remove mortar daubs, smears, leach stains, and clean down the walls. Remove all scaffolding and equipment used in the work, cleaning up all debris and surplus materials and remove same from premises.

END OF SECTION 04050

DIVISION 5 - METALS

SECTION 05060 - MISCELLANEOUS METALS

1.00 GENERAL

1.01 SCOPE

A. Furnish and install all miscellaneous metal work required for this project.

B. Verify conditions and check measurements in the field for metals fabricated to fit job conditions and assume responsibility for proper fitting together of the materials.

C. Prepare surfaces and prime in compliance with Division 9 - Paints and Coatings. Paint anchors to be embedded in masonry with asphaltum.

D. Where dissimilar metals come into contact, apply alkali-resistant paint to more active metal or vinyl isolation gasket between metals. Where steel work contacts aluminum, apply two coats of aluminum paint over shop coat.

1.02 SUBMITTALS

A. Shop drawings shall be submitted on all manufactured and fabricated items outlined. Shop drawings shall be submitted per the specification requirements as stated in Division 1.

B. Submit shop drawings showing location, sizes of metal, method of assembly, hardware, fasteners, anchorage, connection with other work and provisions for accommodating work of other trades.

C. Submit manufacturer's data indicating compliance with the particular requirements of these specifications and with the contract drawings.

D. Submit samples required by these specifications.

2.00 PRODUCTS

2.01 METALS

A. Structural steel shapes, ASTM A36.

B. Steel plates to be bent or cold-formed, ASTM A283, Grade C.

C. Steel bars and bar-size shapes, ASTM A306, Grade 65, ASTM A36.

D. Stainless steel, ASTM A167.

E. Black and galvanized welded and seamless steel pipe, ASTM A120.

F. Galvanized carbon steel sheets, ASTM A526, with 1.24 ounces commercial zinc coating complying with ASTM A525.

G. Gray iron castings, ASTM A48.

H. Bolts and nuts, Type 304, stainless steel ASTM A320, unless otherwise specified.

I. Aluminum, ASTM B221, alloy as specified.

2.02 COATINGS

A. Galvanizing:

1. Iron and steel hardware, ASTM A153.

2. Rolled, pressed, and forged steel, shapes, plates, bars and strips 1/8 inch thick and heavier, ASTM A123.

3. Assembled steel products, ASTM A386.

4. Galvanizing repair paint, high zinc dust content paint complying with military specifications MIL-P-21035.

B. Bituminous paint, cold applied asphalt mastic (extra thick film) Steel Structures Painting Council Standard SSPC-PS9.01.

C. Aluminum Finishes:

1. Clear or color anodized, natural finishes, architectural Class 1 coating in accordance with the Aluminum Association Standard designation as stated below. Use Standard Mill Finish for other work, unless otherwise specified.

2. Ornamental work . . . . AA-M32C12A41(OR42)

3. Anodized finishes shall be coated with two coats of clean, non-yellowing lacquer.

2.03 STAINLESS STEEL WORK

A. Use proper type of stainless steel electrode or welding rods. Grind and polish exposed welded joints to make them imperceptible. Weld parts without injury to appearance, strength, or resistance to corrosion. In general, make fastenings invisible. Obtain approval of Engineer of method of fastening before starting work.

B. Make bends without visible distortion or checking of stainless steel.

C. Remove scratches, marks, pits, or other blemishes on exposed surfaces by grinding or polishing. Entire surface shall have the same finish as surrounding work. After fabrication and finishing, clean to remove oil, grease, finger marks, and other defacements. Passivate in 20 percent nitric acid and clean. Execute handling, cleaning, and finishing operations so defacements will be removed permanently.

D. During transportation, erection, and until adjacent work of other trades is completed, protect stainless steel with strippable plastic coating.

2.04 ABRASIVE NOSINGS

A. Provide on the leading edge of all poured-in-place concrete and concrete-filled metal pan stairs and landings as extruded aluminum nosing, alloy no. 6063-T5 with mill finish. Nosings shall be three inches wide (exposed top surface) and 1/4 inch thick with five abrasive filled ribs.

B. Nosings shall be by American Abrasive Metals Co., Irvington, N.J., Wooster Products Inc., Wooster, Ohio, or equal.

C. Install nosings using concealed 1/8 inch thick flat bar type anchoring devices eight inches on center so that top surface of nosings is flush with finished surface of stair or landing.

2.05 OTHER MISCELLANEOUS METAL ITEMS

A. Provide all other Miscellaneous Metal Items required by contract drawings.

3.00 EXECUTION

3.01 FABRICATION

A. Make holes, connections, and other provisions to accommodate work of other trades.

B. Form miscellaneous metal work to shape and size, with sharp lines and angles. Shear and punch to leave clean, true lines and surfaces. Weld permanent connections. Do not use screws or bolts where they can be avoided, screw up tight and nick threads to prevent loosening. Spring curved work evenly.

C. Furnish castings true to pattern, smooth, straight, sound, free from warp, holes and other defects that impair strength or appearance.

D. Exposed surfaces shall have smooth finish and sharp, well defined lines and arises. Mill machined joints, where required, to a close fit. Provide necessary rabbets, lugs and brackets so that work can be assembled in a neat and substantial manner.

E. Conceal fastenings where practicable. Furnish metal thickness and details of assembly and supports to give ample strength and stiffness. Form joints exposed to weather to exclude water.

3.02 INSTALLATION

A. Installation shall be in accordance with manufacturer's recommendations where applicable and per the detailed drawings where manufacturer is not involved. As work shall be performed per acceptable industry standard and as approved by the resident inspector.

END OF SECTION 05060

DIVISION 5 - METALS

SECTION 05520 - HANDRAILS AND RAILINGS

1.00 GENERAL

1.01 DESCRIPTION

A. The extent of handrails and railings is shown on the drawings, and includes miscellaneous handrails and railings not included in other metal systems in other sections of these specifications.

B. Samples, Handrails, and Railings: If requested, submit to the Engineer one (1) sample of each type of metal finish, including typical welded connections, not less than 6" long. Samples will be reviewed for color and texture only. Compliance with all other requirements is the exclusive responsibility of the Contractor.

C. Submit shop drawings in accordance with General Requirements. Drawings will show locations, dimensions, sections, details of construction and assembly, method of installation and all other pertinent information.

D. All rails shall have internal line-up members at joints.

E. All handrails shall meet OSHA Standards.

2.00 PRODUCTS

2.01 ALUMINUM EXTRUSIONS: ASTM B 221; alloy 6063-T5, except alloy 6063-T6 for pipe; unless otherwise indicated. 1 1/2" diameter, Schedule 40. Clear anodized finish, Type A or B, (ASTM B 580), unless otherwise indicated.

2.02 HARDWARE: The hardware shall be of stainless steel construction.

2.03 MANUFACTURERS

A. Imperial Ornamental Metal Company, Inc.
B. Dittmer Architectural Aluminum
C. Construction Specialties Company
D. Equal

3.00 EXECUTION

3.01 FABRICATION

A. General: Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32", unless otherwise shown. Form bent-metal corners to the smallest radius possible without causing grain separation or otherwise impairing the work.

B. Nonwelded Connections are generally not acceptable except to join adjacent pieces of constructed handrail. When approved by the Engineer, intermediate post-to-rail connections may be made using internal pipe sleeve locks and Allen screw fasteners. Locking devices which do not produce flush, smooth, rigid, hairline joints will not be acceptable. Weld other connections.

C. Welded Connections: Cope intersections of rails and posts, weld joints and grind smooth. Butt weld end-to-end joints or railings or use welding connections, at fabricator's option.

D. Weld corners and seams continuously and in accordance with the recommendations of AWS. Grind exposed welds smooth and flush, to match and blend with adjoining surfaces. Discoloration of finished surfaces will not be acceptable.

E. Form exposed connections with flush, smooth, hairline joints, using concealed fasteners wherever possible. Use exposed fasteners of the type shown, or if not shown, use Phillips flathead (countersunk) screws or bolts.

F. Provide for anchorage of the type shown, coordinated with the supporting structure. Fabricate and space anchoring devices as shown and as required to provide adequate support.

G. Brackets, Flanges and Anchors: Provide brackets, flanges and anchors for railing posts and for handrail supports. Furnish inserts and sleeves as required for anchorage to concrete or masonry work.

1. Furnish cast metal brackets, flanges and exposed anchors of the same material and finish as supported rails, unless otherwise indicated.

3.02 INSTALLATION

A. Fastening To In-Place Construction:

1. Provide anchorage devices and fasteners where necessary for securing handrails and railing items to in-place construction; including, threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts and other connectors as required.

2. Use railing manufacturer's standard methods of installation when acceptable to Engineer.

3. Provide removable railing sections as indicated. Furnish slip-fit metal socket or sleeve for casting into concrete. Accurately locate sleeves to match post spacings.

B. Cutting, Fitting and Placement:

1. Perform cutting, drilling and fitting required for installation. Set the work accurately in location, alignment, and elevation, plumb and level, true and free of rack, measured from established lines and levels.

2. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop-welded because of shipping size limitations. Grind joints smooth and touch-up shop paint coat. Do not weld, cut or abrade the surfaces of units which have been coated or finished after fabrication, and are intended for field connections.

3. Adjust railings prior to securing in place to ensure proper matching at butting joints and correct alignment throughout their length. Space posts not more than 4 feet on centers, unless otherwise shown. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:

4. Anchor posts in concrete as indicated on plans.

5. Provide concealed sleeve expansion joints at twenty (20) foot centers.

END OF SECTION 05520

DIVISION 5 - METAL

SECTION 05530 – GRATING & FIBERGLASS INSULATION PANELS

1.00 GENERAL

1.01 DESCRIPTION

A. The extent of the grating work and fiberglass insulation panels is shown on the drawings and includes grating and fiberglass insulation panels, which is not a part of other metal systems in other sections of these specifications.

B. Submittals:

1. The Contractor shall submit complete detailed shop drawings for all grating and fiberglass insulation panels to the Engineer for approval in accordance with applicable requirements of Division 1. Shop drawings shall include the following information:

   a) Panel sizes and locations.
   b) Dimensions and placement of grating framework.
   c) Openings and cut-outs for piping and equipment.
   d) Special fabrication at openings and cut-outs.
   e) Anchorage types and spacing.
   f) Framework sizes, types and dimensions for fabrication.

2. Sample: Contractor shall submit one (1) sample of each of the following items (if requested):

   a) Grating panel including banding, minimum size 12" x 12".
   b) Grating framework surrounding panel sample.
   c) Anchoring devices.

3. Product Data: Contractor shall submit product data describing grating and fiberglass insulation panels system proposed.

2.00 PRODUCTS

2.01 ACCEPTABLE ALUMINUM GRATING AND TREAD SYSTEMS

A. Extruded Plank Type:

1. Extruded plank type design consisting of 6" wide planks of extruded aluminum, welded to each other to form panels.
2. Grating shall be as manufactured by McNichols Co., Cleveland, Ohio; Washington Aluminum Co., Inc., Baltimore, Maryland; or approved equal.

B. Aluminum "I" Bar Type:

1. Fabricated from extruded "I" shaped aluminum sections with continuous perpendicular cross bars perpendicular to bearing "I" bars.

2. Grating of this type shall be:

   a) "I-Lok" grating as manufactured by Reliance Steel Products Co., McKeesport, Pennsylvania.

   b) McNichols "I" Bar Grating as manufactured by McNichols Co., Cleveland, Ohio.

   c) Or approved equal.

2.02 QUALITY ASSURANCE

A. All grating shall be of the same type and of the same manufacturer for the entire project.

B. Grating shall be fabricated in accordance with the details as shown on the drawings and shall be designed for a live load of not less than 100 pounds per square foot, with deflection not exceeding 1/360 of the span.

2.03 STOCK

A. Materials - Extruded Plank Type:

1. Grating shall be extruded of aluminum ASTM B 221, Alloy 6063-T6.

2. Banding shall be extruded of aluminum ASTM B 221, Alloy 6063-T6.

3. Framing shall be of extruded aluminum ASTM B 221, Alloy 6061 or 6063.

B. Materials - "I" Bar Type:

1. Bearing "I" bars shall be extruded of aluminum ASTM B 221, Alloy 6061-T6.

2. Cross bars shall be extruded of aluminum ASTM B 221, Alloy 6063-T1.

3. Framing shall be of extruded aluminum ASTM B 221, Alloy 6061 or 6063.

C. Fabrication - Extruded Plank Type:

1. Consist of 6" wide planks of extruded aluminum welded to each other to form panels.

2. Panels shall be banded with an extruded aluminum end bar welded in place.

3. Grating shall be heavy duty type with integral "I" bars at 1.2" center to center.

4. Furnish with square upset punch pattern.

D. Fabrication - "I" Bar Type:

1. "I" shaped bearing bars shall be spaced not more than 1-3/16" center to center.

2. Cross bars shall be perpendicular to the bearing bars and secured to the bearing bars by welding or mechanical locking device.

3. Cross bars shall be continuous through width of each panel and not more than 4" center to center.

4. Surface of "I" bearing bars shall be grooved longitudinally.

5. Panels shall be constructed with a 3/16" thick extruded aluminum bar welded to the ends of the bearing bars.

E. Fabrication - General:

1. Grating shall be fabricated in accordance with details shown on the drawings.

2. The floor grating shall be accurately fabricated free from warps, twists or other defects which effect the appearance and serviceability of the grating. All grating shall be banded to the full depth of the grating, otherwise indicated.

3. Where holes are required for passage of pipes, or other purposes, they shall be provided and the grating shall be reinforced where necessary to preserve its strength. All these cutouts shall be banded to the full depth of the grating and welded at each bearing bar.

4. Use materials of the size and thickness shown, or if not shown, of the size recommended by product manufacturer. Work to the dimension shown or accepted on final shop drawings, using proven details of fabrication and support. Use the type of materials shown or specified for the various components of the work.

5. Coordinate fabrication of grating with structural steel, equipment and mechanical fabrication as required.

6. Perform fabrication work complete, detailed including openings and cut-outs in a manner to minimize the necessity of field cut openings, cut-outs and banding of panels.

F. Frames: Frames shall be required for embedment in concrete and shall be as follows:

1. Extruded of aluminum angle shapes.

2. Shall be designed with a fastener recess to permit securing the grating at any point without requiring the chipping of the concrete.

3. Frame shall be of the proper depth for the grating installation.

4. Frame extruded aluminum shape shall have a continuous "T" shape anchor, for secure anchorage to cast-in-place concrete.

5. The continuous anchor shall have a 2" long notch every 18" to insure full penetration of concrete.

6. All frame surfaces in contact with concrete shall be given one (1) shop coat of zinc chromate primer.

G. Fasteners:

1. Fastening shall be accomplished by use of an aluminum plate between the bearing bars and tightening by means of a stainless steel bolt against the lower flange of bearing "I" bars.

2. Fasteners shall be hidden giving a smooth surface with no protrusions.

2.04 FIBRGLASS INSULATIO PANELS

A. The pultruded fiberglass skin is available in either an isophthalic polyester or a vinyl ester resin. Both resin systems provide flame retardance (UL94 VO). The vinyl ester is utilized in extreme corrosive applications. A synthetic surfacing veil is incorporated into the skin to improve weathering, corrosion resistance and resistance to degradation from ultraviolet rays. Resistance to weathering can be further enhanced by the application of a polyurethane paint. The core material is a rigid closed-cell urethane foam. The ends of the panels must be encapsulated or coated with a resin similar to the skin resin to maintain the corrosion and weather resistant qualities of the total panel. The panels shall be DURASHIELD Fiberglass Foam Core Building Panels or approved equal. The synthetic coatings shall be as per the manufacturers specifications.

3.01 <u>EXECUTION</u>

A. Install frames to be embedded in concrete securely fastened to the formwork and properly braced and anchored. Set frames accurately in location, alignment and elevation, plumb, level, true and free of rack.

B. Grating shall be set with a full and uniform bearing on the structural supports to preclude rocking movement. Wedges or similar shimming devices shall not be used.

C. Fit exposed connections accurately together to form tight hairline joints.

D. Weld non-removable units to supporting members or framework. Secure removable units to supporting members or framework with fasteners.

E. Perform all cutting, drilling and fitting required for installation. Set the work accurately in location, alignment and elevation, plumb, level, true and free of rack.

F. Wherever bar gratings are pierced by pipes, ducts, and structural members, cut openings neatly and accurately to size and weld a strap collar not less than 1/8" thick to the cut ends of the bars.

G. Divide the panels into sections only to the extent required for installation wherever bar grating platforms, runways, etc., are to be placed around previously installed pipe, ducts, and structural members.

END OF SECTION 05530

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION 07111 - BITUMINOUS DAMP PROOFING

1.00 GENERAL

A. Related Documents: The general provisions of the Contract apply to the work specified in the section.

B. Scope: Furnish all labor and materials to complete damp proofing of all below grade concrete work. Additional damp proofing shall be as specified herein and as shown on the plans.

C. Surface Conditions: Application of material constitutes acceptance of surface conditions by waterproofing contractor. Before starting work, check the following:

1. Concrete walls and tops of footings: Cleaned of fins, mortar droppings, mud, oil, etc.

2. Wall ties cut back and pointed.

3. Pipes, sewers, etc., through walls: caulked or grouted tightly in place, flush with outside of wall.

4. Exterior surfaces of foundation walls below grade to be damp proofed shall prepared in accordance with the damp proofing manufacturer's recommendations.

5. All pre-cast concrete structures not specifically required to be coated by the pre-caster.

2.00 PRODUCTS

A. "Sonneborn Hydrocide 700 Mastic", or equal, a heavy-bodied non-sag coating, formulated with a heavy content of selected bitumens for trowel application.

B. Sonneborn 700B, or equal for spray or brushed application. Brush application shall receive two coats. Total mil thickness shall be 10-12 mils dry film thickness. Surface preparation shall be brush-off blast (SSPC-SP7) and in accordance with the manufacturer's recommendations.

C. Tnemec Series 46H-413 or equal for spray application. Total mil thickness shall be 10-12 mils dry film thickness. Surface preparation shall be brush-off blast (SSPC-SP7) and in accordance with the manufacturer's recommendations.

D. Reference Paragraphs 1.33, A-F in Section 01110 Summary of Work regarding "equal" products and substitutions.

3.00 EXECUTION

A. Apply in accordance with manufacturer's printed specifications to 1/8" film thickness.

3.01 GUARANTEE

A. This Contractor shall guarantee dampproofing work for a period of one (1) year protecting Owner against dampness on inside face of dampproofed walls caused by defective materials or workmanship.

END OF SECTION 07111

DIVISION 9 - FINISHES

SECTION 09511

SUSPENDED ACOUSTICAL CEILINGS

1.00 GENERAL

1.01 SCOPE

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.02 SUBMITTALS

A. Shop drawings, catalog cuts and specifications are required.

B. Product Data: Provide data on suspension system components and acoustical units.

C. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and other pertinent data required for proper installation.

1.03 QUALITY ASSURANCE

A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three (3) years experience.

B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three (3) years experience.

1.04 ENVIRONMENTAL REQUIREMENTS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.05 PROJECT CONDITIONS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Install acoustical units after interior wet work is dry.

1.06 EXTRA MATERIALS

A. Provide 144 sq. ft. of acoustical units for Owner's use in maintenance of project.

2.00 PRODUCTS

2.01 ACOUSTICAL UNITS

A. Manufacturers:

1. Daiken Excel – Tone MR

B. Acoustical Panels:

1. Size: 24 x 24 inches.
2. Thickness: 5/8 inch
3. Surface Color: White
4. Product: Item Bevelled Revealed Edge

5. Suspension System: Exposed grid, 15/16 grid face

2.02 SUSPENSION SYSTEM(S)

A. Manufacturers:

1. Armstrong World Industries, Lancaster, PA 17604

B. Suspension Systems – General: ASTM C 635; die cut and interlocking components, with stabilizer bars, clips, splices, and perimeter moldings as required.

C. Exposed Suspension System: Formed galvanized steel, commercial quality cold rolled; heavy-duty.

1. Profile: Tee; 15/16 inch wide face.
2. Prelude XL exposed tee
3. Finish: white

2.03 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Perimeter Moldings: Same material and finish as grid.

1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.

C. Touch-up Paint: Type and color to match acoustical and grid units.

3.00 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION – SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM E 580 and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Locate system on room axis according to reflected plan.

D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

E. Provide hangers and inserts as required.

F. Hang suspension system independent of walls, columns, ducts, pipes, and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

G. Where ducts and other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

I. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

J. Do not eccentrically load system or induce rotation of runners.

K. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.

1. Use longest practical lengths.
2. Overlap and miter corners.

3.03 INSTALLATION – ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install units after above-ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

F. Cutting Acoustical Units:

1. Cut to fit irregular grid and perimeter edge trim.
2. Make field cut edges of same profile as factory edges.
3. Double cut and field paint exposed reveal edges.

G. Install hold-down clips on panels within 20 ft. of an exterior door.

3.04 ERECTION TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION 09511

DIVISION 9 - FINISHES

SECTION 09900 - PAINTS AND COATINGS

1.00 GENERAL

1.01 DESCRIPTION OF WORK

A. The work covered by this section consists of furnishing all materials, accessories, equipment, tools, transportation, and performing all operation incidental to the execution and completion of all painting and finishing in accordance with this section of the specifications and applicable drawings and subject to the terms and conditions of the Contract.

B. Painting or finishing includes surface preparation, priming, finish painting, inspection, cleaning, touch-up of surfaces and equipment, in addition to shop priming and surface treatment specified elsewhere.

C. Concealed surfaces are required to be painted unless otherwise specified.

D. The work includes painting and finishing of interior and exterior exposed items and surfaces throughout the project, except as otherwise indicated.

E. "Paint", as used herein, means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

F. Paint all exposed surfaces except where the natural finish of the material is specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas.

G. If color or finish is not designated, the Owner will select these from standard colors available for the material system specified.

H. All work shall be subject to inspection by the Owner, Engineer, or a representative thereof, but this in no way reduces the responsibility of the Contractor to comply with the technical requirements of the Specification.

1.02 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM D 3925
2. ASTM D 4285

B. Code of Federal Regulations

1. 29 CFR 1910.134
2. 29 CFR 1910.1000
3. 29 CFR 1910.1200

C. NACE International – The Corrosion Society (NACE)

1. NACE RP0287 Standard Recommended Practice Field Measurement of Surface Profile of Abrasive Blast Cleaned Steel Surfaces Using a Replica Tape

D. SSPC – The Coating Society (SSPC)

1. SSPC Guide VIS 1 Guide to Visual Standard for Abrasive Blast Cleaned Steel
2. (1989) Visual Standard for Abrasive Blast Cleaned Steel.
3. SSPC SP 1 Solvent Cleaning

4. SSPC SP 6 Commercial Blast Cleaning

5. SSPC SP 7 Brush-Off Blast Cleaning

6. SSPC SP 10 Near-white Blast Cleaning

7. SSPC SP 13 Concrete Surface Preparation

8. SSPC PA 1 Paint Application Specification No. 1, Shop, Field and Maintenance Painting.

9. SSPC PA 2 Measurement of Dry Pain Thickness with Magnetic Gauges.

1.03 SURFACES TO BE PAINTED (UNLESS OTHERWISE SPECIFIED)

A. All new exterior building surfaces (excluding vinyl siding, pre-finished metal siding and masonry block).

B. Complete interior finish of all building rooms in new buildings and building addition.

C. All new exposed mechanical and process equipment and piping not specified to have galvanized, aluminum, or stainless steel finish.

D. All new structural and miscellaneous steel not specified to have galvanized, aluminum or stainless steel finish.

E. Ferrous metal items not galvanized, including structural and miscellaneous steel, ductwork, conduit, piping, hangers, supports, valves, motors, etc., above suspended ceilings shall be given one coat of prime paint or spot primed, as required, before applying paint.

F. All piping and equipment in lift station wet well and valve pits.

G. Primary Clarifier, Secondary Clarifier, and Chlorination Structure bridges to be near-white blast cleaned and repainted.

1.04 PAINTING NOT INCLUDED

A. The following categories of work are not included as part of the field-applied finish work, or are included in other sections of these specifications:

1. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under the various sections for structural steel, miscellaneous metal, hollow metal work, and similar items. Also, for fabricated components such as wood casework and shop-fabricated or factory-built mechanical and electrical equipment or accessories.

2. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer-finishing is specified for such items as, but not limited to, acoustic materials, finished mechanical and electrical equipment, including light fixtures, switchgear and distribution cabinets, doors and equipment.

3. Concealed Surfaces: Unless otherwise indicated, painting is required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas and pipe spaces. All steel piping above ceilings shall be painted.

4. Finished Metal Surfaces: Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting unless otherwise indicated.

5. Operating Parts and Labels:

   a) Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting, unless otherwise indicated.

b) Do not paint over any code-requiring labels, such as Underwriter's Laboratories and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plates.

6. Surfaces not to be Painted: Buried piping, aluminum, stainless steel; galvanized (unless indicated); copper, glass, plastics, prefinished hardware and treated wood surfaces.

1.05 QUALITY ASSURANCE

A. General:

1. All materials shall be delivered in sealed original containers bearing manufacturer's label specifying the quality, grade and description of the contents.

2. The object of these specifications is to provide the material and workmanship necessary to produce a first-class job. Painting shall be done at such times as the Contractor and Engineer may agree upon in order that dust-free and neat work can be obtained. All painting shall be done strictly in accordance with the manufacturer's instructions and shall be performed in a manner satisfactory to the Engineer.

B. Applicable Standards: Steel Structures Painting Council (SSPC) Surface Preparation Specification and the National Association of Corrosion Engineers (NACE).

C. Materials:

1. All materials specified herein are to be manufactured by the Tnemec Co., Inc., North Kansas City, Missouri, Carboline or equal, and are approved for use on this project.

2. Materials specified are those that have been evaluated for the specific service. Products of the Tnemec Co. are listed to establish a standard of quality. Equivalent material of Carboline or approved equal manufacturers may be substituted on approval of the Engineer.

a) Any requests for substitution shall be made in writing to the Engineer at least 10 days prior to the bid opening and shall include manufacturer's literature for each project listing the name, product number, generic type, descriptive information, solids by volume, recommended dry film thickness and certified test data showing results to equal the performance criteria of the products listed herein. In addition, a list of ten projects shall be submitted in which each product has been used and rendered satisfactory service.

b) Reference Paragraphs 1.33, A-F in Section 01110 Summary of Work regarding "equal" products and substitutions.

D. Test Equipment: Contractor to provide and maintain the following equipment on the jobsite for testing of paint and coating films, testing to be done under the observance and approval of the Inspector.

1. Wet Mil Gauge: For checking of wet film thickness to determine approximate dry film of each coat.

2. Dry Mil Gauge: For testing of total film thickness of total coats or dry film thickness of single coat of primer or finish coat. Used only on ferrous surfaces. Gauge type: Mikrotect or Elcometer.

a) Dry film thickness (DFT) shall be measured in accordance with SSPC-PA 2

3. Holiday Detection Device: For testing and detection of holidays in a dry coating system.

1.06 SUBMITTALS

A. Color Samples: Submit five sets of manufacturer's standard color samples for each type of paint required for color selection.

B. Manufacturer's Data - Painting: Submit manufacturer's technical information including descriptive information and application instructions for each material proposed for use.

1.07 DELIVERY AND STORAGE

A. Deliver all material to the job site in original new and unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Name or title of material.
2. Federal specification number, if applicable.
3. Manufacturer's stock number and date of manufacture.
4. Manufacturer's name.
5. Contents by volume, for major pigment and vehicle constituents.
6. Thinning instructions.
7. Application instructions.
8. Color name and number.

1.08 JOB CONDITIONS

A. Apply water base paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 50 degrees F and 90 degrees F, unless otherwise permitted by the paint manufacturer's printed instructions.

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 50 degrees F and 95 degrees F, unless otherwise permitted by the paint manufacturer's printed instructions.

C. Do not apply paint in snow, rain, fog or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions.

D. Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application and drying periods.

1.09 PROTECTION

A. Protect the work as required by the Engineer.

B. Cover or otherwise protect work of other trades, surfaces not being painted, and surfaces not to receive paint. Provide "wet paint" signs to protect newly painted surfaces. Remove and dispose of all protective materials when appropriate.

C. Provide necessary masking materials and protective covers where feasible. Remove all paint droppings and spots from adjacent and finished surfaces.

D. Maintain paint storage and working areas in a clean, safe, and orderly condition. Maintain storage and working areas well-ventilated and free of rags and trash accumulation.

E. Temporarily remove, mask, or otherwise protect finish hardware, machined surfaces, grills, prefinished equipment and lighting fixtures as required. Protect mechanical and electrical equipment such as nameplates, gauges, switches, relays and motors. Protect polished, finished and moving parts from damage by sandblasting and other surface preparation.

F. Prevent paint and paint overspray from entering openings in mechanical and electrical equipment.

2.00 PRODUCTS

2.01 GENERAL

A. Materials furnished for each coating system must be products of a single manufacturer and compatible to the substrate. When shop painted surfaces are to be coated, ascertain whether finish materials will be compatible with shop coating. Inform Engineer of any unsuitable substrate or coating conditions. Start of work by applicator will signify acceptance of surface to be painted.

B. Colors and finishes shall be as selected by the Owner.

C. Color Pigments: Pure non-fading, applicable types to suit the substrates and service indicated.

D. Paint Coordination: Provide finish coats which are compatible with prime paints used. Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information on characteristics of finish materials proposed for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required at no cost to the Owner. Notify the Engineer in writing of any anticipated problems using specific coating systems with substrates primed by others.

2.02 MATERIAL QUALITY

A. Provide the best quality grade of the various types of coatings as regularly manufactured by acceptable paint material manufacturers. Materials not displaying the manufacturer's identification as a standard, best-grade product will not be acceptable.

B. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer, and use only within recommended limits.

2.03 PAINTING SYSTEMS

A. Proprietary names used to designate colors or materials in the following painting system descriptions are not intended to imply that products of named manufacturers are required to the exclusion of equivalent products by other manufacturers.

1. System C-1: Concrete exposed to sewer gas including all of the coarse screening structure throughout the full height, the lift station, the valve pit, the headworks channel, all manholes and the UV channel.

    a) Surface Preparation: SSPC SP13 to achieve 60-80 grit profile

    b) First Coat: Tnemec Series 218 full parge coat

    c) Second Coat: Tnemec Series 446 Hydrophobic Aromatic Polyurethane (color); 8-10 mils dry film thickness

    d) Final Coat: Tnemec Series 446 Hydrophobic Aromatic Polyurethane (color); 8-10 mils dry film thickness

2. System C-2: Concrete floors and steps under roof.

    a) Surface Preparation: Pressure wash clean

    b) First Coat: Chemprobe Series 629 Silicate Blend (clear); 0.25 lbs./sq. yd.

    c) Second Coat: Chemprobe Series 629 Silicate Blend (clear); 0.25 lbs./sq. yd.

3. System C-3: Interior masonry block.

    a) Block Surfacer: Tnemec Series 54-562 Fine Masonry Filler; 80-100 sq. ft per gallon.

b) Intermediate Coat: Tnemec Series 6 industrial grade acrylic; 2.0 – 3.0 mils dry film thickness (color)

c) Finish Coat: Tnemec Series 6 industrial grade acrylic; 2.0 – 3.0 mils dry film thickness (color by Owner).

4. System M-1: All non-buried D.I.P. used for Sewer Piping (exposed and submerged), valve stems and hand wheels and non-buried valves and fittings. Miscellaneous submerged piping for uses other than sewer shall also be coated with System M-1.

a) Surface Preparation: SSPC SP6 Commercial blast cleaning

b) First Coat: Tnemec Series 446 Hydrophobic Aromatic Polyurethane (color); 7-9 mils dry film thickness

c) Final Coat: Tnemec Series 446 Hydrophobic Aromatic Polyurethane (color); 7-9 mils dry film thickness

5. System M-2: Structural Steel including Pre-Engineered metal building structural steel, steel hand rails, and ballards

a) Surface Preparation: SSPC SP6 Commercial blast cleaning

b) First Coat: Tnemec Series 1 Aromatic Polyurethane, 2.5-4 mils dry film thickness

c) Second Coat: Tnemec Series N69 Polyamidoamine Epoxy, 2-4 mils dry film thickness

d) Final Coat: Tnemec Series 1074 Aliphatic Acrylic Polyurethane (color by Owner), 2-5 mils dry film thickness

6. System M-3: Shop primed metal items such as door frames, window frames, etc. Does NOT include shop primed structural steel.

a) Surface Preparation: SSPC SP 1 Solvent Cleaning

b) First Coat: Tie Coat – Tnemec Series 530 Moisture Cured Aromatic Polyurethane, 2-3 mils dry film thickness

c) Final Coat: Tnemec Series 1074 Aliphatic Acrylic Polyurethane (color), 2-5 mils dry film thickness

7. System M-4: All non-submerged, non-buried steel and D.I.P. not used for sewer piping including waterlines, gas lines, air piping, rigid conduit, etc. including valve stems and hand wheels and non-buried valves and fittings.

a) Surface Preparation: SSPC SP7 brush-off blast cleaning.

b) First Coat: Tnemec Series 1 Aromatic Polyurethane, 2.5-4 mils dry film thickness

c) Second Coat: Tnemec Series N69 Polyamidoamine Epoxy, 2-4 mils dry film thickness

d) Final Coat: Tnemec Series 1074 Aliphatic Acrylic Polyurethane (color), 2-5 mils dry film thickness

2.04 PIPING COLOR CODE

A. To facilitate identification of process and chemical piping, the following piping color scheme shall be utilized:

Waterlines	Color	Tnemec Color
Raw	Olive	110GN Clover
Settled or Clarified	Aqua	10GN Aqua Sky

Finished or Potable	Dark Blue	11SF Safety Blue
Chemical Lines	**Color**	**Tnemec Color**
Alum or Primary Coagulant	Orange	04SF Safety Orange
Ammonia	White	11WH White
Carbon Slurry	Black	35GR Black
Caustic	Yellow w/Green Band	09SF Safety Green & 02SF Safety Yellow
Chlorine (Gas & Solution)	Yellow	02SF Safety Yellow
Fluoride	Light Blue w/Red Band	25BL Fountain Blue & 06SF Safety Red
Lime Slurry	Light Green	38GN Margarita
Ozone	Yellow w/Orange Band	02SF Safety Yellow & 04SF Safety Orange
Phosphate Compounds	Light Green w/Red Band	38GN Margarita & 06SF Safety Red
Polymers or Coagulant Aids	Orange w/Green Band	04SF Safety Orange &09SF Safety Green
Potassium Permanganate	Violet	14SF Safety Purple
Soda Ash	Light Green w/Orange Band	38GN Margarita & 04SF Safety Orange
Sulfuric Acid	Yellow w/Red Band	02SF Safety Yellow & 06SF Safety Red
Sulfur Dioxide	Light Green w/Yellow Band	38GN Margarita & 02SF Safety Yellow
Waste Lines	**Color**	**Tnemec Color**
Backwash Waste	Light Brown	68BR Twine
Sludge	Dark Brown	84BR Weathered Bark
Sewer (Sanitary or Other)	Dark Gray	47GR No 2 Pencil
Other	**Color**	**Tnemec Color**
Compressed Air	Dark Green	91GN Balsm
Gas	Red	28RD Monterrey Red
Other Lines	Light Gray	32GR Light Gray
Electric Conduits	Orange	04SF Safety Orange

B. In situations where two (2) colors do not have sufficient contrast to easily differentiate between them, a six (6) inch band of contrasting color should be on one (1) of the pipes at approximately thirty (30) inch intervals. The name of the liquid or gas should also be on the pipe. In some cases, it is also advantageous to provide arrows indicating the direction of flow.

3.00 EXECUTION

3.01 GENERAL

A. Apply all coatings in accordance with manufacturer's application requirements relating to primers, surface preparation, mixing, spreading rates, thinning, surface temperature, application equipment, curing times, clean-up and safety precautions.

B. Do not apply finish in areas where dust is being generated.

C. Do not proceed with surface preparation or coating application until conditions are suitable. All adjacent areas, equipment, etc., shall be masked, covered or protected to prevent any paint, coating, cleaning particles, or spillage, splashing and overspray from resting or adhering to any surface other than area prepared for protective covering.

D. On metal surfaces, each coat of paint shall be applied at the rate specified by the manufacturer to achieve the minimum dry mil thickness required. On concrete and/or masonry, application rates will vary according to

surface texture. However, in no case shall the manufacturer's stated coverage rate be exceeded. On porous surfaces, a protective and decorative finish shall be achieved. Deficiencies in film thickness shall be corrected by the application of an additional coat(s) of paint. Where conditions are other than normal because of the weather or because painting must be done in confined spaces, longer drying times will be necessary. Additional coats of paint shall not be applied, nor shall units be returned to service until paints are thoroughly dry.

E. Where thinning is necessary, only the products of the manufacturer furnishing the paint, and for the particular purpose, shall be allowed, and all such thinning shall be done strictly in accordance with the manufacturer's instructions, as well as with the full knowledge and approval of the Engineer. Where two or more coats are specified, first coat shall be tinted a minimum of three shades lighter than the color specified, and progressively to the final coat and subject to approval.

F. Comply with recommendation of product manufacturer for drying time between succeeding coats.

3.02 INSPECTION

A. Examine surfaces scheduled to receive paint and finish coatings for conditions that will adversely affect the execution, permanence and quality of work. Do not proceed with surface preparation or coating application until conditions are suitable.

3.03 SURFACE PREPARATION

A. All surfaces shall be prepared in accordance with manufacturer's recommended guidelines for the surface, exposure and conditions and material system used, or as specified herein, whichever is more stringent.

B. If any surface to be finished cannot be put in proper condition by customary cleaning operations, notify Engineer immediately in writing or assume responsibility for any resulting unsatisfactory finish.

C. All surfaces shall be prepared in a workmanlike manner and shall be smooth, clean and dry:

1. Metal: All rust, dust and scale shall be removed. Where sandblasting is specified, the paint shall be applied within the same day as sandblasting operation. All metal work supplied, unless otherwise specified, shall be primed in shop. All metal surfaces received at jobsite without prime coat that was to be primed shall be field sandblasted before application of primer.

2. Concrete surfaces shall be cleaned of dust, free from oil, curing compounds, and other foreign matter prior to painting. Concrete floor surfaces to be painted shall be etched with 10-20% solution of muriatic acid to obtain a texture equivalent to 100 grit (medium) sandpaper.

3. Wood surfaces shall be thoroughly cleaned and free of all foreign matter, cracks, nail holes, etc., properly filled and smoothed. Wood trim shall be sandpapered to fine finish and cleaned of dust.

4. Metal surfaces (steel doors, frames, windows, electrical equipment, etc.) specified to receive an epoxy or polyurethane paint finish shall be primed with proper prime coat in lieu of standard factory baked-on enamel finish.

D. All rusted areas due to abrasion, field welding and burning, handling and erection shall be cleaned by the proper cleaning method originally specified for such surfaces or used in factory priming of surfaces. Field welds and burns shall be cleaned and be free of welding flux, spatter and rust as well as the areas adjacent to the welded area or bead.

E. All steel surfaces for immersion service which have been primed and exposed to the sunlight for 60 days or longer shall be scarified before application of top coats.

F. All ferrous metal surfaces for immersion service with field welded areas, abraded or scoffed areas or other areas of which shop prime coat is damaged, on these such areas the surface shall be prepared in accordance with SSPC-SP10 and spot-coated with primer same as shop coat.

3.04 APPLICATION

A. Conform with manufacturer's printed recommendations.

B. Apply paint and finish coatings with brushes, rollers or spraying equipment.

1. Rate and method of application shall be as required to obtain specified dry film thickness for each coat or as recommended by the product manufacturer's literature for substrate and exposure.

2. Maintain application equipment in a clean, workable condition.

C. Vary color of successive coats slightly for identification.

D. Sand, polish and dust between each coat to remove defects visible from a distance of 5' or less. Surfaces subject to touch shall be smooth and even.

E. Apply coats smooth, uniform in color, free of brush marks, streaks, visible laps, sags or skips.

1. Use film thickness gauges to determine that required thickness of coating is being applied.

F. Do not apply additional coats until completed coat has been inspected and approved by the Engineer.

G. Finish to a clean, sharp line to adjoining dissimilar materials or colors with no overlapping or runs.

H. Refinish all of section where surface finish has been damaged or is not acceptable.

I. Back-prime all wood, exterior and interior wood trim prior to installation.

3.05 CLEANING

A. Remove spilled, dripped or splattered paint from all surfaces.

B. Maintain storage and work areas in clean, safe condition.

C. Upon completion, remove all paint materials, equipment and refuse.

END OF SECTION 09900

DIVISION 10 - SPECIALTIES

SECTION 10441 - FIRE EXTINGUISHERS

1.00 GENERAL

1.01 DESCRIPTION

A. This section includes everything necessary for and incidental to the execution and completion of fire extinguishers and fire extinguisher cabinets as indicated on the drawings and specified herein.

B. Related Documents: Drawings and general provisions of contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.

C. Description of Work: "Portable Fire Extinguishers" include units which can be hand-carried as opposed to those which are equipped with wheels or to fixed fire extinguishing systems, unless otherwise indicated. Type of products in this section include:

1. Fire extinguishers and accessories (including mounting brackets)

D. Quality Assurance: Provide portable fire extinguishers and accessories by one manufacturer, unless otherwise acceptable to Engineer.

2.00 PRODUCTS

A. Fire Extinguishers: (FE) Provide fire extinguishers for locations indicated, in colors and finishes selected by Engineer from manufacturer's standard which comply with requirements of governing authorities.

2.01 FIRE EXTINGUISHERS

A. Fire extinguishers shall be similar to Cosmic 10E, UL rating 4A-60BC, multiple purpose dry chemical as manufacturer by J. L. Industries or equal.

1. Reference Paragraphs 1.33, A-F in Section 01110 Summary of Work regarding "equal" products and substitutions.

B. Fire extinguishers shall be furnished with an all steel bracket for wall mounting.

C. Five (5) fire extinguishers are required for the project.

D. Locate fire extinguishers in each of the following locations as shown on the drawings:

1. Headworks Building – two (2)
2. Laboratory/Office Addition – one (1)
3. Blower Building – one (1)
4. UV Building – one (1)

3.00 EXECUTION

3.01 INSTALLATION

A. Install items included in this section in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities.

B. Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.

C. Where exact location of surface-mounted bracket-mounted fire extinguishers is not indicated, locate as directed by Engineer.

D. General Contractor shall be responsible for having fire extinguishers filled, pressurized and ready for use.

E. General Contractor shall see that all work under this section shall be protected against damage until final acceptance of building

F. Identify bracket-mounted extinguishers with red letter decals spelling "Fire Extinguisher" applied to wall surface. Letter size, style, and location as selected by Engineer. Proper signage may be substituted for decals.

END OF SECTION 10441

DIVISION 11 - EQUIPMENT

SECTION 11286 – SLIDE GATES

1.00 GENERAL

A. The Contractor shall furnish all labor, materials, equipment and services necessary to complete the construction and installation of the hand gates as shown on the drawings and as specified herein.

2.00 PRODUCTS

2.01 SLIDE GATES

A. The slide gates shall be constructed of aluminum plate 6061-T6 alloy to the dimensions as indicated on the drawings. The guide frames shall be of extruded aluminum alloy 6063-T6 with welded mitered corners. Hand gates shall be of one manufacturer as manufactured by Halliday Products, Rodney Hunt, or approved equal.

B. The slide gate will be a minimum of a 1/4" aluminum plate reinforced as required so that the plate will not deflect more than 1/360 of the span under the designed head of liquid.

3.00 EXECUTION

A. The Contractor shall install the hand gates as shown on the drawings and as recommended by the manufacturer. They shall be installed and adjusted for proper operation. The guide frames shall be cast in the concrete plumb and square with the concrete walls and floor.

3.01 SHOP DRAWINGS

A. Shop drawings shall be furnished according to the General Conditions.

END OF SECTION 11286

DIVISION 11 - EQUIPMENT

SECTION 11322 – INCLINED GRIT SCREW

1.00 GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and General Provision of the contract, including General and Supplementary Conditions and Division 16 Specification Sections, apply to work of this section.

1.02 DESCRIPTION OF WORK:

A. The Contractor shall furnish and install one (1) Grit Screw Collector in the new grit chamber as shown on the contract drawings.

1.03 SYSTEM DESCRIPTION:

A. The grit collection system shall be complete with a grit screw, grit screw transport trough, drive, discharge port, support, aeration header, blower and anchors. Interconnecting air piping shall be by the general contractor

1.04 REFERENCES:

A. American Gear Manufacturers Association (AGMA)

B. American Society of Civil Engineers (ASCE)

C. American Society of Testing and Materials (ASTM)

D. American Welding Society (AWS)

E. International Electro technical Commission (IEC)

F. Steel Structures Painting Council (SSPC)

1.05 PERFORMANCE:

A. The aerated grit removal system shall be designed to handle the following flow ranges:

1.	Minimum:	0.20 MGD
2.	Average:	0.45 MGD
3.	Maximum (Design):	3.0 MGD
4.	Peak (Observed):	10.0 MGD

1.06 QUALITY ASSURANCE:

A. The equipment covered by these specifications is intended to be standard equipment having been on the open market for a minimum of ten (10) years and of proven ability, and as manufactured by reputable concerns. The equipment furnished shall be designed, constructed and installed in accordance with best practices and methods, and shall operate satisfactorily.

1.07 DELIVERY, STORAGE AND HANDLING:

A. Handle the equipment carefully to prevent damage. Do not install damaged equipment.

B. The Contractor shall prepare the concrete bed for the transport screw trough according to the manufacturer's written directions.

1.08 SUBMITTALS:

A. Copies of all shop drawings and product data sheets required to establish compliance with these specifications shall be submitted to the Engineer in accordance with Section _____.

B. Submit two (2) Operations and Maintenance (O&M) Manuals for approval (see Section _____ for submittal requirements).

2.00 PRODUCTS

2.01 MANUFACTURER:

A. Model ADSC – Aerated Grit Screw AMWELL – Aurora, IL 60504

B. Other manufacturers may bid to this specification if the equipment meets or exceeds the letter and intent of the Specification. To be selected as an approved equal, a submittal showing compliance with the material and specifications will be submitted no later than fifteen (15) days before the bid opening. All manufacturers must submit a detailed drawing and shall provide dimensions to show that all the proposed equipment and equipment components conform to the drawings and specifications. Furnish two (2) copies of each of the manufacturer's installation manual, and two (2) copies of the manufacturers operation and maintenance manual for review as part of the bid submittal. Selected equipment manufacturers will be added by addendum

2.02 DRIVE ASSEMBLY:

A. The collector drive shall consist of a 20 RPM, helical screw conveyor reducer with a premium efficiency minimum 1.5 HP, 3 phase, 60-hertz 230/460 volt TEFC motor for outdoor service, directly connected to the grit screw. Drive unit shall be designed for starting and operating the unit intermittently under design conditions without overloading. The assembly shall have a service factor of no less than 1.6. Drive output shaft shall be a solid cold rolled steel shaft for connecting to screw.

2.03 CONTROL PANEL

A. A grit screw and blower Main Control Panel shall be furnished, completely pre-wired and tested, requiring only wall mounting and connection to external wiring by an electrical contractor in the field. Control Panel shall include all equipment required to control the grit screw as specified herein.

B. The inclined grit screw and blower control panel shall be enclosed in a NEMA 4X Stainless Steel enclosure which will be mounted on the headworks structure as shown in the plans. The control panel shall receive 230/460 volt feeder power.

C. The grit screw shall be controlled by individual variable frequency drives (VFD), sized as required for grit screw motor horsepower and suitable for use with variable torque loads. At main panel: ESD mushroom pushbutton, On/Off 2-position selector switch. VFD shall include discrete and analog input and outputs as required by control panel manufacturer. VFD shall comply with IEEE 519 requirements.

D. NEMA rated motor starters and breakers shall be included for both the inclined grit screw and the blower.

E. In addition to the above criteria, the control panel shall also consist of the following major components:

1. Main power disconnect inside panel with external operating handle
2. Motor disconnects
3. HOA Switches
4. ON/OFF Switches
5. 24 hour timer for grit screw
6. 24 hour timer for blower
7. Overload protection for the inclined grit screw
8. Visual and Audible Alarm indication for inclined grit screw overload
9. Overload reset pushbutton

10. Relay contacts for inputs/outputs to SCADA system as required
11. Auxiliary fused control transformers for the panel
12. Fuses as required

2.04 COLLECTOR SCREW AND BEARINGS:

A. The collector screw shall be 12-inch diameter, ½ pitch with 3/8-inch steel flights welded to a 3-inch diameter extra heavy steel pipe core; screw sections to be coupled together with hardened coupling bolts; lower end to have a fitted two (2) piece Stoody chromium cobalt alloy bushing and bearing; upper to be connected to the reducer output shaft. Screw shall be provided with hard iron hanger bearings as required; lower bearing to be water lubricated; upper bearing to be grease lubricated. Secured grease lines and fittings shall be provided for the upper hanger bearings. The driving face of the screw shall have a Hard-X type surface applied to it for abrasion resistance

2.05 EFFLUENT AND U-TROUGH:

A. The u-shaped trough shall be fabricated of 1/4-inch thick 304 stainless steel plate with an upper portion effluent trough and adjustable weir plate to control the flow. The trough is to be provided with 304 stainless steel support legs. The complete trough sections above the operating floor are to be covered with removable 304 stainless steel 12 gauge access plates for inspection. The effluent trough shall be sized for the stated flows in Section 1.5 and be provided with adjustable weirs as required. The trough shall be constructed of ¼" 304 stainless steel and designed to connect to the concrete effluent structure. The trough shall be properly supported in the channel.

B. A baffle plate with scum ports shall be included. The baffle shall be constructed of ¼" 304 stainless steel and properly supported in the channel.

2.06 TAIL END BEARING ASSEMBLY:

A. A special tail end bearing shall be furnished for mounting to the inside of the trough.

B. Assembly to include a steel shaft, flange mounted and machined for grease lubrication.

C. Shaft to be furnished with a Stoody chromium cobalt alloy bushing machined to suite the I.D. of the Stoody chromium cobalt alloy bushing which is inserted into the tail end of the screw pipe core. No alternative materials will be considered. The stoody bearing materials shall be of slightly different hardness ranges.

2.07 AIR DIFFUSION ASSEMBLY:

A. Coarse bubble diffusers shall be of the flexible diaphragm type. Each diffuser shall consist of an injection molded corrosion resistant polypropylene base and a long life EPDM (ethylene propylene diene monomer) rubber diaphragm. The diffuser shall incorporate air discharge from the underside of the assembly to prevent fouling, and shall provide a self-cleaning wiping action between the diaphragm and the base. A molded baffle on the base shall be designed to distribute the air evenly around the periphery.

B. The diaphragm shall be designed to provide a positive check valve action to minimize the entry of debris and liquid into the air piping when air flow ceases. Projections on the base shall fit into specially shaped recesses in the diaphragm to eliminate diaphragm loss due to high air pressure. The diaphragm shall be field replaceable by extending over the base projections.

C. The base shall be molded with suitable radii at all intersections to eliminate fatigue failure and environmental stress cracking under all service loads. Base stem dimension shall correspond to those of ¾" SCH 80 pipe; molded threads shall be ¾" NPT male.

D. The diffuser shall be capable of discharging 3 to 15 SCFM of air. Headloss vs. flow characteristics shall be approximately linear throughout the entire range to aid in uniform air distribution through multiple diffusers. Headloss shall not exceed 2 inches of water at 3 SCFM and shall not exceed 10 inches of water at 15 SCFM. Nominal headloss shall be 6 inches of water at 10 SCFM.

E. The diffusers as described above shall be the Flexcap Diffusers as manufactured by Mooers Products, Incorporated, Milwaukee, Wisconsin or preapproved equal.

F. Diffusers shall be assembled to a 304 stainless steel pipe fabrication terminating at the top of the channel. All anchor bolts and pipe supports shall be 304 stainless steel.

2.08 BLOWER

A. Air supply to the aeration header shall be furnished by a pad mounted blower. The blower assembly shall be a rotary positive displacement type complete with fabricated elevated steel base, drive and driven sheave with enclosed guard, V-belts, inlet filter, silencers, flexible connectors, check valve, discharge pressure gauge, expansion joint, adjustable discharge pressure relief valve, vibration pads and motor.

B. The blower assembly shall have a rated air flow of not less than 16.5 SCFM at a rated discharge pressure of 4.5 psig. The blower package shall be designed for outdoor service at a mean elevation of 666 FTASL.

C. Motor shall not be less than 1.5 HP, 3 phase, 230/460 VAC, horizontal, normal starting torque, drip proof motor.

D. Provide a hinged fiberglass hood to protect the blower assembly from the weather and provide noise reduction.

2.09 SPARE PARTS:

A. The following spare parts shall be provided:

1. Two (2) hard iron hanger bearing inserts.
2. Six (6) coarse bubble diffusers
3. Two (2) sets of V-belts for the blower

2.10 SHOP PAINTING:

A. All ferrous metals that are not stainless steel shall be prepared, primed and finished painted with two (2) coats of Tnemec Series 69 Epoxoline paint.

3.00 EXECUTION

3.01 INSTALLATION:

A. The Contractor shall position, anchor, and secure all components in strict accordance with the manufacturer's printed instructions and recommendations, these specifications, and as shown on the drawings.

B. The Contractor shall supply all necessary labor, temporary lifting equipment, power, water and all requirements for satisfactory installation.

3.02 OPERATOR TRAINING:

A. The Contractor shall provide operator training for Owner's personnel for start-up and training. Training shall take place with the manufacturer's representative after the field start-up, testing, and inspection, and will be done with the Engineer's approved Operations & Maintenance Manual. The manufacturer shall allow one (1) trip and one (1) day for this for this service.

END OF SECTION 11322

Section Replaced per Add # 1

"The motor for the bar screen shall be a maximum of 2 horsepower." "The heat trace shall consist of two (2) - 3,000 watt heating elements. Heating elements shall be 208V." "Provide a 208V/2P-20A circuit breaker, and 2#12's and 1 #12 Ground in 3,4" conduit to each of (2) 3,000 Watt sections of heat trace from the load center furnished as part of MCC-5. Provide a 2P-30A, non-fused, NEMA 4X disconnect switch at each final connection to the heating element." Per Add # 2

DIVISION 11 – EQUIPMENT

SECTION 11332 - AUTOMATIC COURSE BAR SCREEN

1.00 GENERAL

1.01 DESCRIPTION OF WORK

A. This specification establishes the complete requirements for the manufacture and delivery of one (1) fully automatic mechanically cleaned Bar Screen to remove rags, debris and other inert material from incoming wastewater. The manufacturer shall furnish one (1) Standard Duty Mechanically Cleaned Bar Screen, complete with all accessories, stainless steel hardware and controls, in compliance with the following specifications.

B. The Bar Screen shall be delivered complete with the drive assembly, controls, spare parts, anchor bolts and all other appurtenances as specified and as may be required for a complete operating installation.

C. All equipment shall be shipped to the jobsite pre-assembled and complete. All equipment shall be manufactured and fully assembled within the United States. All major components and assemblies shall be fully assembled and factory tested prior to delivery to the jobsite, including the drive and motor, electrical controls, and related appurtenances.

1.02 MANUFACTURERS

A. This equipment specification is intended to provide a base or minimum acceptable standard for materials and engineering. Only quality equipment of proven reliability, and manufactured by an established and reputable company with more than 10 years experience in the production of screening equipment will be considered. All equipment and equipment components furnished shall be designed and constructed in accordance with current best materials, practices and methods. The equipment shall integrate and operate satisfactorily for a twenty-year intermittent and/or continuous duty life-cycle at maximum design capacity when properly installed, maintained and operated per the manufacturer's site-specific recommendations.

B. Subject to compliance with requirements of these specifications and plans, manufacturers offering screens that may be supplied for the application include the following:

1. Amwell - Division of McNish Corporation, FC Design
2. Or engineer pre-approved equal

C. Other manufacturers may bid to this specification if the equipment meets or exceeds the letter and intent of the Detailed Component Specification. To be selected as an approved equal, a submittal showing compliance with the material and specifications will be submitted no later than fifteen (15) days before bid opening. Selected equipment manufacturers will be added by addendum.

1.03 BID SUBMITTALS

A. As part of the equipment bid submittal, all manufacturers must furnish the following information:

1. Detail Drawings: Shall include all data and dimensions to show that all proposed equipment and equipment components conform to these specifications.

2. Manuals: Furnish two (2) copies each of a typical manufacturer's installation manual, and two (2) copies of a typical manufacturer's operation and maintenance manual for review as part of the bid submittal.

1.04 ENGINEERING SUBMITTALS

A. Detail Drawings: Shall include all data, dimensions and individual component details to show that the equipment conforms to all detail specifications.

B. Manuals: Furnish six (6) copies each of the manufacturer's installation and start-up manuals, and six (6) copies of the manufacturer's operation and maintenance manuals for review as part of the engineering submittal.

1.05 OPERATION

A. The screen will be front cleaned with multiple cleaning rakes moving at sufficient speed to pass through and completely clear the bar rack at least once per minute. Back cleaned screens will not be acceptable.

B. The Bar Screen will be capable of automatic operation based on a timed operating sequence provided by a 24-hour timer; and by an increase in the water level in the influent flow channel as sensed by a float switch.

1.06 WARRANTY

A. The manufacturer shall warrant that all of its equipment shall be free of defects in materials, craftsmanship, and design and/or engineering for a period of 12 months from the date of start-up and final acceptance by the Owner. The Manufacturer shall furnish all labor and materials to repair and/or replace any such parts, components and equipment found to be defective, faulty, and/or unreliable at no cost to the Owner for the entire warranty period.

1.07 QUALITY ASSURANCE

A. The mechanically cleaned screen will be furnished by a manufacturer who is experienced in the manufacturing of mechanically cleaned bar screens. The Manufacturer will provide data on their screening experience. The screening Manufacturer will have a minimum of 10 years experience in the manufacture of similar mechanically cleaned bar screens.

2.00 EQUIPMENT

2.01 GENERAL

A. The bar screen will include: Cleaning rakes, rake wiper, investment cast 15-5/17-4 PH stainless steel CS720S series carrier chains and attachment links; polymeric segmental rim headshaft sprockets with fabricated or cast iron hubs, and all polymeric footshaft sprockets; 17-4 PH stainless steel shafting for the headshaft, 316 stainless steel shafting for the footshaft, greaseable self-aligning double-row tapered headshaft bearings with double lip contact seals; drive unit complete with worm gear or helical gear reducer, explosion-proof electric motor with greaseable bearings, and shear pin overload device; explosion-proof limit and positioning switches; minimum R588 drive chain, drive and driven sprockets, or headshaft mounted drive reducer; fully enclosed stainless steel side frames, bar rack, dead plate, discharge chute, head section and foot section; mechanism to concrete side wall sealing plates and neoprene seals as required, NEMA 7 304 stainless steel control panel, explosion-proof float switch with floor stand, 304 stainless steel float, channel mounted schedule 80 PVC tube for the float stilling well. The Screen shall be equipped with heat tracing. The screen shall be completely assembled and factory tested prior to shipment.

B. The Bar screen shall designed to be pivoted out of the channel for inspection.

2.02 DESIGN REQUIREMENTS

A. See plan sheets for additional dimension details

1. Maximum design flow per screen: 3.0 MGD

2. Average flow per screen: 0.45 MGD

3. Minimum flow per screen: 0.20 MGD

4. Channel width: 3'

5. Channel depth: approximately 7' 3¾" See Plans for details

6. Discharge height: Minimum 4'-0"

7. Screen inclination: 84 Degrees

8. Operation platform to channel bottom: 8' 3¾"

9. Bar rack spacing: 1"

10. Maximum Screenings Removal Capacity: 1.0 cu.ft./min.; 60 cu.ft./hr.

2.03 DETAILED COMPONENT SPECIFICATIONS

A. Cleaning Rakes

1. A minimum of four (4) cleaning rakes will be mounted on two (2) strands of chain running over two (2) sets of sprocket wheels at a speed of approximately 7 FPM. Rakes will be spaced no greater than 7'-0" apart. The debris will be removed from the bar racks by the cleaning rakes, conveyed up the dead plate to the discharge point where the rakes will be cleaned by the rake wiper.

2. Cleaning rake teeth shall be 304 stainless steel and 3/4" thick, with a tooth configuration of suitable shape with minimum 1" penetration to effectively clean the front and sides of the bars in the bar rack. The rakes will be not less than 8" wide with not less than a 6-3/4" solid shelf provided for debris carrying capacity in front of the bar rack. The rake teeth will be bolted to and supported by a minimum 1/2" thick 3" by 5" structural steel angle extending the full length of the rake and bolting to the chain attachments. The rake tooth plate will be adjustable for aligning with and maximizing engagement with the bar rack.

B. Rake Wiper

1. A gravity operated rake wiper, of not less than 1/4" thick 304 stainless steel, will be furnished with replaceable 3/8" thick virgin UHMW polyethylene wiper blade and wear strips bolted to two (2) structural pivot arms. The wiper blade will be reversible, with two cleaning edges. The arms will be mounted on a minimum 1" diameter 304 stainless steel pivot shaft and supported by self-aligning greaseable ball bearings. The wiper arms will be designed to return the wiper quietly and without shock to the screen. The entire wiper mechanism will be located within the head section.

C. Carrier Chains

1. Chain materials and design shall meet or exceed ASME B29.21M-1996 standards for 700 Class Cast Chains and Attachments for Water and Sewage Treatment Plants. Collector chains shall be CS720S series 15-5/17-4 PH investment cast stainless steel alloy, having 6.00" pitch links with an average weight of 2.9 pounds per link, and 5.8 pounds per foot. Fabricated and/or welded chain designs are not acceptable. Chains links and pins shall be smooth throughout, and be free from casting burrs, voids and material defects. All chain links shall maintain a +/- .010" uniform dimensional tolerance between all individual links and link components, and chains shall not require match marking between strands to assure uniformity. Chain links and chain pins shall be heat-treated and through-hardened to an H900 standard, with an average hardness of 39 to 44 Rc. Chains shall be suitable for operating on either cast, fabricated or non-metallic (polymeric) sprockets.

2. The chains shall have minimum 1.50" diameter barrels, and minimum .250" thick by 1.50" high sidebars, with a .375" thick by .375" high reinforcing rib running laterally along the chain sidebars from the pin boss (open end of the link) to the chain barrel (closed end of the link). Chain sidebars at

the pin boss (open end of the link) shall have a minimum .625" thick by 1.50" high sidebar dimension. The chain shall have a certified ultimate strength of 80,000 pounds, and a rated working load of 8,000 pounds.

3. The chain shall be assembled with 3/4" diameter investment cast 17-4 PH stainless steel chain pins. Chain pins shall be designed to rotate both within the chain barrel and chain pin boss (open end) of the link. Chain pins that are press fit into the chain sidebars, or that use T-heads, rivets, or other non-rotational devices to lock the chain pin in place are not acceptable. Chain pins shall be designed to be inserted into the link sidebars without applying mechanical force, and from either side of the chain link. Chain pins and link designs that require the application of mechanical force for assembly, and/or that only allow the chain pin to be inserted into the link sidebars from one side or direction are not acceptable.

4. All links shall be the P&C design with removable pins and removable cotters; riveted chain pin designs are not acceptable. Cotter pins and washers for the chain pins shall be 302 series stainless steel. Chain pin cotters shall be a T-head design, minimum ¼" inch diameter and 1" long.

5. Attachment links will be AD474-type unitized, one-piece 15-5/17-4 PH stainless steel investment castings. Attachments links that use bolted, press-fit, fabricated or welded attachment extensions on a standard chain link are not acceptable.

6. Chain materials and design concepts shall have a minimum of 10 years demonstrated experience successfully operating in submerged water and/or wastewater treatment applications within the continental United States. Carrier chains shall have a 20-year design life and a minimum 10-year warranty when applied, installed, operated and maintained within chain design parameters and traditional industry standards. All drive chain components shall be manufactured and assembled in the U.S.A. Carrier chains shall be CS720S-15-5/17-4 SS as manufactured by Environmental Resources or equal.

D. Drive Chains

1. The drive chain will meet or exceed the standards for R588 steel roller type, 2.609" pitch links, will be suitable for slush oil lubrication, will have a minimum working load of 2,450 lbs, and a minimum ultimate strength of 17,000 pounds. The drive chain and sprockets will be suitably covered with a #12 gauge 304 stainless steel guard. The chain guard shall be hinged and designed to provide ease of maintenance access by a single operator for removing and replacing drive sprocket shear pins, and for adjusting the drive chain tension. Drive chains shall be Rexnord R588, or equal.

E. Alternate to Drive Chains

1. As an alternate to using a conventional drive chain, drive and driven sprockets for the power transmission components, manufacturers may use a shaft mounted speed reducer (see "K. DRIVE UNIT" below).

F. Drive and Driven Sprockets

1. All drive sprockets will be furnished without chain saver rims. Sprockets for the drive chains will be cast or fabricated steel or cast iron with minimum 360 BHN hardened teeth with minimum 3/16" chill depth, or non-metallic (polymeric) segmental rim sprockets with a cast or fabricated steel hub. Polymeric sprocket teeth will be manufactured from minimum 70-75 Shore D polyurethane having a water absorption rate not to exceed 1.3% at saturation in accordance with ASTM D-570.

2. Each drive sprocket assembly shall consist of a cast iron or fabricated steel sprocket hub with a standard alemite grease fitting, grease-lubricated bronze bushing, and a cast iron or fabricated steel driving hub. All polymeric drive sprocket and hub assemblies will not be acceptable. The drive sprocket hub will be firmly keyed and/or double set screwed to the drive reducer output shaft. Drive sprocket and hub shall be designed with an integral shear pin device. Driven sprocket hubs will be

keyed firmly and double set screwed to the headshaft at the keyway and 180 degrees opposite the keyway.

3. The drive sprocket assembly shear pin device shall provide for protection of the drive equipment in the event of excessive loading. A polymeric gasket or insulating bushing shall be located between the metal shear faces to prevent seizing. The driver sprocket hub shall be provided with a metal trip lug that, upon torque overload, shall contact the actuator arm of a double throw limit switch. All assembly connecting hardware shall be 316 stainless steel.

4. 3/8" diameter 1100-H18 or 2017-T4 aluminum alloy, or alternate soft metal alloy shear pins shall be provided to transmit torque from the driving hub to the sprocket shear plate. Steel alloy shear pins shall not be acceptable. Shear pin sizing and selection shall protect the drive unit and screen components from damage, and shall have sufficient strength to convey solids at the maximum rated design.

5. The driven chain sprocket on the headshaft will be a solid hub design, 26-tooth, 21.64 PD. The reducer drive sprocket will be 11-tooth, 9.26 PD with a minimum hub bore of 1-3/4" in diameter, and a minimum through bore of 4-3/4", keyed to the reducer shaft and fitted with a shear pin device with bronze bushing to provide full load protection to the drive unit.

G. Alternate to Drive and Driven Sprockets

1. As an alternate to using a conventional drive chain, drive and driven sprockets for the power transmission components, manufacturers may use a headshaft mounted speed reducer (see "K. DRIVE UNIT" below).

H. Carrier Chain Sprockets

1. All headshaft sprockets will be furnished with chain saver rims. All screen headshaft sprockets will be of a double-life tooth profile, and shall be not less than 17-tooth, 16.61 PD. Sprocket teeth will be manufactured from minimum 70-75 Shore D polyurethane having a water absorption rate not to exceed 1.3% at saturation in accordance with ASTM D-570.

2. Headshaft sprockets will have a polymeric rim bolted to a split fabricated steel or cast hubs. The hubs shall be split to facilitate replacement, and shall be tightly keyed and set screwed to the headshaft.

3. All footshaft sprockets will be furnished without chain saver rims. Footshaft sprockets will be free to turn on the stub shaft and held in place by use of a recessed 304 stainless steel retainer plate bolted and pinned to the stub shaft. Footshaft sprockets will be solid body all polymeric design, minimum 70-75 Shore D polyurethane. Footshaft sprockets and stub shaft will be provided with centrifugally cast chromium cobalt tungsten nickel alloy bushings and sleeves of similar but slightly different materials, and with a hardness range of 40-49 Rc and 50-56 Rc respectively. Bushings will be press fit into the foot sprocket bores, and sleeves will be press fit on the stub shafts. Bushings and sleeves shall have a minimum ¼" thickness, and be as manufactured by Stoody, Inc. or equal.

4. Finished footshaft sprockets shall be fitted with ¼" thick bushings for a finished bore of 2-15/16" (+.003"/-.000"), and shall turn freely on a minimum 2-7/16" diameter 316 stainless steel shaft sleeved with ¼" thick bushings. The stub shaft with sleeves will have a minimum finished diameter of 2-15/16" (+.000"/-.010") with the sleeves installed.

I. Shafting

1. Headshaft will be solid 17-4 PSQ grade stainless steel heat-treated and through hardened to an average 32 to 35 Rc. Keyways with fitted 316 stainless steel keys will be provided where necessary. Stub shafts will be solid 316 stainless steel.

2. The headshaft shall have a diameter of not less than 2-15/16". The headshaft will be equipped with an adjustable screw-type take-up providing for a minimum 6" vertical adjustment for proper tensioning of the screen chains. The take-up device will be accessible from the operating floor.

3. The stub shafts will be fixed replaceable 2-7/16" diameter 316 stainless steel shafts mounted on a minimum 3/8" thick 316 mounting plate bolted to the screen side frames, and shall be provided with sleeves as specified under sprocket description, and will have a finished diameter of not less than 2-15/16".

J. Bearings

1. The headshaft bearings will be double-row tapered self-aligning roller bearings with double-lip contact seals. Headshaft bearings shall be provided with standard alemite lubrication fittings, grease lines and mounting brackets for ease of maintenance from the operating floor. The headshaft bearings will be capable of continuously supporting the mechanism under moderate to severe shock loads and maximum operating conditions without failure. Bearings shall have a minimum 200,000 hour B-10/L-10 continuous duty rating at maximum design load.

K. Drive Unit

1. The drive unit assembly shall have a speed reducer and electric motor connected by a flexible coupling and mounted on a standard deep-well C-flange adapter, with gaskets at the motor and reducer connections. The standard deep-well C-flange adapter shall be made from cast iron or fabricated steel. The motor output shaft will be coupled to the reducer input shaft by means of a Lovejoy coupling, or similar rubber/polymeric element motor/reducer type coupling. Quill-type coupling arrangements or similar metal-to-metal motor/reducer shaft couplings are not acceptable.

2. Drive unit shall conform to AGMA rating and specification for moderate to severe shock loads, and a continuous 200,000 hour B-10/L-10 rating at full operating load, with a service factor as noted in the following specifications. Drive shall be Class II. The screen drive assembly shall be furnished with a new NEMA 4X double button on-off switch with local lock-out cam mounted to the screen frame. Switches shall be as manufactured by Allen-Bradley, or equal.

3. The drive unit will be of the motorized type mounted on an adjustable drive chain take-up base on the screen head section. The drive unit speed reducer will be of the worm gear or helical gear type, fully housed, running in synthetic oil, with anti-friction roller bearings throughout, and a minimum service factor of 1.5. The drive housing shall be provided with non-pressurizing vent plugs, oil fill, oil level and drain plugs, and galvanized drain piping fitted with nominal size ball valves and safety plugs for ease of maintenance. Grease filled or grease lubricated reducers are not acceptable.

4. The speed reducer will be capable of continuously operating the mechanism under moderate to severe shock loads and maximum operating conditions without failure. The reducer shall have a minimum 1-3/4" diameter output shaft. Reducer housing shall be painted with a coating suitable for corrosive, moisture laden environments. Speed reducer shall be as furnished by Peerless-Winsmith, Springville, NY; SEW Eurodrive, Troy, OH; Foote-Jones, Chicago, IL; or approved equal.

5. The motor will be NEMA 7 explosion-proof totally enclosed, fan-cooled or non-ventilated type with grease lubricated ball bearings with standard alemite fittings. Motors shall be single speed, 1750 RPM and of ample power for starting and continuously operating the mechanism under full load, continuous operating conditions without overloading, with a 40°C ambient temperature rise, and a minimum service factor of 1.25. Motor will conform to NEMA 7 explosion-proof application standards for Class 1 Division 2 service, and be rated 230/460 volt, 3 phase, 60 Hz current.

6. The drive unit and motor will be assembled by the Manufacturer and shipped as a complete assembly to ensure proper alignment of all motor/reducer components.

L. Alternate Drive Unit

1. As an alternate to using a conventional drive chain, drive and driven sprockets for the power transmission components, manufacturers may use a shaft mounted speed reducer.

2. The drive unit assembly shall have a speed reducer and electric motor connected by a flexible coupling and mounted on a standard deep-well C-flange adapter, with gaskets at the motor and reducer connections. The standard deep-well C-flange adapter shall be made from cast iron or fabricated steel. The motor output shaft will be coupled to the reducer input shaft by means of a Lovejoy coupling, or similar rubber/plastic element motor/reducer type coupling.

3. Drive unit shall conform to AGMA rating and specification for moderate to severe shock loads, and a continuous 200,000 hour B-10/L-10 rating at full operating load, with a service factor as noted in the following specifications. Drive shall be Class II. The screen drive assembly shall be furnished with a new NEMA 7 double button on-off switch with local lock-out cam mounted to the screen frame. Switches shall be as manufactured by Allen-Bradley, or equal.

4. The drive unit will be of the motorized type mounted on an adjustable drive chain take-up base on the screen head section. The drive unit speed reducer will be of the worm gear or helical gear type, fully housed, running in synthetic oil, with anti-friction roller bearings throughout, and a minimum service factor of 1.5. The drive housing shall be provided with non-pressurizing vent plugs, oil fill, oil level and drain plugs, and galvanized drain piping fitted with nominal size ball valves and safety plugs for ease of maintenance.

5. The speed reducer will be capable of continuously operating the mechanism under moderate to severe shock loads and maximum operating conditions without failure. The reducer shall have a minimum 2-15/16" diameter hollow (female-type) output shaft, and shall be keyed and set screwed directly to the headshaft. Reducer housing shall be painted with a coating suitable for corrosive, moisture laden environments. Speed reducer shall be as furnished by Peerless-Winsmith, Springville, N.Y.; SEW Eurodrive, Troy, OH.; Foote-Jones, Chicago, IL.; or approved equal.

6. The motor will be NEMA 7 explosion-proof totally enclosed, fan-cooled or non-ventilated type with grease lubricated ball bearings with standard alemite fittings. Motors shall be single speed, 1750 RPM and of ample power for starting and continuously operating the mechanism under full load, continuous operating conditions without overloading, with a 40°C ambient temperature rise, and a minimum service factor of 1.25. Motor will conform to NEMA explosion-proof application standards and be rated 230/460 volt, 3 phase, 60 Hz current.

7. The motor shall be wired to an amperage sensing electronic overload relay in the control panel. The overload device shall be capable of sensing full rated amperage and shutting the drive motor down without damage to the motor, reducer, bar screen, motor starter circuitry, or other ancillary electronic components and equipment.

8. The drive unit and motor will be assembled by the Manufacturer and shipped as a complete assembly to ensure proper assembly of all components.

M. Side Frames

1. The screen will be of a design utilizing not less than 1'-8" wide x 5" deep structural side frames to which are bolted the bar rack and dead plate resulting in a structurally self-supporting unit. Designs in which side frames or chain guides are supported from the channel walls will not be acceptable. The screen side frames and chain guides shall be fully enclosed 304 stainless steel, not less than 1/4" thick, and will include U-shaped guides for both the carrying and return run of the screen chain.

2. The U-shaped guides will assure proper meshing between the rake teeth and the bar rack, and proper clearance between the rake teeth and the dead plate. The U-shaped guides will provide minimal clearance to prevent debris from coming in contact with the screen chains.

3. The side frames will include shrouds around the footshaft sprockets to prevent debris from interfering with the proper meshing of the chains and sprockets. The shrouds will also be designed to prevent grit accumulation at the chain and sprocket location.

4. The side frames and support members will be of sufficient structural and material size to enable the screen to be self-supporting on the floor of the screen channel without distortion. The screen will be supported by the operating floor only, and will not be directly attached to the channel walls or channel floor.

5. Side wall seal plates with 1/4" thick replaceable neoprene strips and 304 stainless steel clamping bars and hardware will be furnished with the screen to close off the area between the side frames and channel walls. The seal plate clamping bars will be not less than 1/4" thick 304 stainless steel, and shall bolt to the screen frame. The seal plates and clamping bars shall extend from the channel floor to the top of the influent channel.

N. Bar Rack

1. The bar rack will be 304 stainless steel and consist of vertical bars, 1/4" thick x 2" wide with 1" clear openings, held firmly and accurately in place by means of welded spacers at each end and in the middle of the bar rack assembly. To reduce the potential for jamming, the bottom of the rack shall have gradually tapered bars extending from the curved boot plate to a point just above the top of the footshaft sprockets. The bar rack will extend from the bottom of the channel to the top of the influent channel, and be connected at that point to the dead plate. The bar rack assembly will be so constructed to be readily removable.

O. Dead Plate

1. The dead plate will be constructed of not less than 1/4" thick 304 stainless steel, will be bolted to the side frames of the screen, and will extend from the top of the bar rack to the point of discharge. A 1/4" thick stainless steel lip will be provided at the discharge point of the dead plate.

P. Discharge Chute

1. A enclosed discharge chute of not less than #12 gauge 304 stainless steel will be provided to guide the debris from the lip at the top of the dead plate to the discharge point. Clearance between the bottom of the discharge chute and the operating floor will be not less than 4'-6". The bottom of the chute will be lined with a removable plate made from minimum ¼" thick UHMW-PE polyethylene plastic and bolted to the discharge chute with countersunk 3/8" diameter 316 stainless steel machine screws.

Q. Head Section

1. The side frames of the bar screen will act as the side panels of the head section above the operating floor. The portion of the head section supporting the drive unit will be fabricated of not less than 1/4" thick 304 stainless steel plate. The balance of the head section will be covered with #12 gauge 304 stainless steel with 3/16" thick stainless steel supports. The hood over the headshaft assembly will be removable #12 gauge 304 stainless steel, and will be provided with lifting handles for removal and access to the headshaft assembly. The head section will be provided with walk-in inspection doors and a fully enclosed discharge area to minimize "chimney effect" and freezing of the deadplate during cold weather, and for easy access and observation of the screen headshaft, wiper and discharge chute.

R. Electrical Control Panel

1. The screen manufacturer shall provide (1) Primary Control Panel for mounting in a remote room adjacent to the screen. This room has an explosion-proof requirement under existing code. All

components shall be Allen-Bradley or equal. The 304 stainless steel enclosure shall be rated NEMA 7 and contain the following:

a) Main circuit breaker with disconnect switch
b) Magnetic motor starters
c) Control transformer
d) 24-hour Time clock adjustable in 15 minute increments to initiate timed operating sequences
e) Duration timer adjustable from 1 to 15 minutes to control the length of operating sequences
f) Power "on-off" selector switch
g) Screen shear pin failure light with alarm signal to Plant Operations
h) Screen running light
i) Power on light
j) H-O-A selector switch
k) 3-phase motor amperage meter (Emotron)

2. For the alternate, shaft-mounted drive unit only:

a) Panel mounted electronic amperage sensing overload relay assembly in the "Auto" mode, the Bar Screen shall run by the float switch or a repeat cycle timer .

S. Explosion-Proof Electrical Controls and Components

1. The screen manufacturer shall provide NEMA 7 explosion-proof components and accessories, Allen-Bradley or equal, for mounting on or near the screen in the screen room. These shall include, but are not limited to, such electrical components and accessories as follows:

a) Shear pin limit switch for disengaging the motor starter and actuating the shear pin failure light and alarm in the event of shear pin failure

b) Local on/off switch with lock-out cam

c) Rake positioning limit switch for shutting down the screen when the cleaning rakes are no longer in the bar rack or foot section

d) Floor-mounted float switch with floor stand, 304 stainless steel float, and channel mounted schedule 80 PVC tube for the float stilling well. The float switch shall be mounted in the influent channel several feet upstream of the screen, and shall capable of starting the screen with a rise in water level.

T. Heat Tracing

1. The dead plate shall be heat traced, insulated and jacketed above the operating floor level up to the top of the dead plate where screenings are discharged. Heat tracing shall be suitable for Class 1, Division 1 areas. Insulation shall be approximately 1" thick. Jacketing shall be 304 Stainless Steel material. The surface where heat tracing is installed shall be energized by a thermostat that turns on the heat tracing when the outside air temperature reaches 40 degrees F. Heat tape shall extend outside the screen for field termination in an enclosure furnished as by the equipment manufacturer that houses the contacts, thermostat, terminal strips, etc. and is, in turn wired to the main control panel of the bar screen.

2.04 SPARE PARTS

A. The following list of recommended spare parts shall be furnished with the screen:

1. Shear Pin Sprocket (only), no hub
2. 1 R588 Drive Chain, P&C, Complete
3. 36 Shear Pins

4. 2 Stainless Steel rake tooth plates

5. 1 UHMW-PE Rake Wiper Blade

2.05 FACTORY ASSEMBLY

A. The screen will be factory tested and shipped assembled ready for installation into the channel. The screen may be disassembled to some degree at the job site in order to move and install the screen into the screen building. The screen frames will be provided with bolted splice joints at the midsection, and at least 2 feet above the operating floor, to facilitate disassembly and re-assembly of the bar screen during installation.

B. The screen will be assembled with 316 stainless steel hardware, American Standard, throughout. All hardware (except the heads of countersunk machine screws) must be furnished with flat washers under all bolt heads, and under all nuts. All hardware must also be furnished with flat washers, split lock washers and standard hex nuts.

2.06 FACTORY SURFACE PREPARATION AND FINISH PAINTING

A. This specification provides a complete surface preparation and coating system for the entire bar screen, all carbon steel surfaces, both immersion and non-immersion. Motor/speed reducers shall not be painted, but shall remain the manufacturer's original finish as specified. All exterior stainless steel surfaces shall remain unpainted, but shall be cleaned, buffed and passivated to remove any weld splatter, surface rust or blemishes.

3.00 EXECUTION

3.01 INSTALLATION

A. The screen will be installed in accordance with the manufacturer's instructions and these plans and specifications by the Owner. All conduit and interconnecting wiring between the primary control and secondary control station will be supplied and installed by the Owner.

3.02 START-UP

A. The screen manufacturer will provide the services of a factory-trained Service Technician to assist in the start-up of the screens and train personnel in the operation and maintenance of the equipment. The screen manufacturer will provide one (1) days of service and one (1) trip to the jobsite for start-up and training.

END OF SECTION 11332

DIVISION 11 - EQUIPMENT

SECTION 11850 - INFLUENT LIFT STATION

Section Replaced pre Add # 1

1.00 GENERAL

a. The existing lift station will not be rehabilitated. The influent lift station is new construction according to Plans and Specifications herein.

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 1 Specification Sections, apply to this Section.

B. Technical Specifications including:
1. 09900 Paints and Coatings
2. 16050 Basic Electrical Materials and Methods
3. 16060 Grounding and Bonding
4. 13920 Control Panels

1.02 DESCRIPTION OF WORK

A. The Contractor shall furnish all labor, materials, tools and equipment to construct the Influent Lift Station and appurtenances as shown on the drawings and described in the specifications.

B. The influent lift station shall consist 4 submersible pumps inside a poured in place concrete structure with partial open top complete with valve vault and metering manholes as shown in the plans.

1.03 DEFINITIONS (NONE)

1.04 PERFORMANCE REQUIREMENTS

A. Design Summary:

1. Furnish and install two (2) totally submersible electrically operated WET WEATHER sewage pumps and (2) totally submersible electrically operated DRY WEATHER sewage pumps with level controls. The pumps and controls shall be located as shown on the contract plans. Four (4) sets of piping, guiderails and brackets, and pump bases, will be required to be furnished and installed under this contract.

2. Static Head will be approximately 44.0 feet.

3. Required Performance:

Wet Weather Pumps

Flow Per Minute U.S. Gallons	Discharge Head Feet	Pump Efficiency	Operating Frequency (Ea)
Single Pump Full Speed			
0	140	-----	----
1540	68.2	68.6%	80 Hz
Single Pump Reduced Speed			
1070	54.6	70.5%	50 Hz
Two Pumps Full Speed			
2080	89.6	68.6%	60 Hz
Two Pumps Reduced Speed			
746	48.1	54.8%	40 Hz

Dry Weather Pumps

Flow Per Minute U.S. Gallons	Discharge Head Feet	Pump Efficiency	Operating Frequency (Ea)
Single Pump Full Speed			
0	134	-----	
859	58.7	67%	60 Hz
Single Pump Reduced Speed			
395	54.6	70.5%	45 Hz

1.05 SUBMITTALS

A. Product Data: Include the following:

1. Product literature
2. Manuals
3. Complete product description
4. Affidavits of compliance with referenced standards and codes.
5. Manufacturer's warranty
6. A list of all deviations from drawings and specifications.

B. Shop Drawings: All shop drawing submittals shall be in accordance with the General Conditions and Division 1 and include the following:

1. Dimensions and required clearances
2. Weights and forces
3. Layout for all equipment including installation details

C. Operation and Maintenance Data: Three (3) copies of the manufacturer's Maintenance and Operating Instructions Manual shall be provided with the equipment at the time of delivery. Three (3) copies that include all revisions made during start-up shall be provided after final acceptance.

D. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.06 QUALITY ASSURANCE

A. The supplier manufacturer shall, in addition to the Contractor, assume the responsibility for proper installation and functioning of the equipment.

B. The Contract Documents represent the minimum acceptable standards for equipment specified in this section on this project. All equipment shall conform fully in every respect to the requirements of the respective parts and sections of the drawings and specifications. If not named, the equipment which is a "standard product" with that manufacturer shall be modified, redesigned from the standard mode and shall be furnished with special features, accessories, materials of construction or finishes as may be necessary to conform to the quality mandated by the technical and performance requirements of the specification.

C. Factory Tests: Manufacturer shall factory assemble equipment to detect any defects and demonstrate that they will function satisfactory under all conditions specified. Manufacturer shall prepare and submit a written report on the results of remedial action taken, if any.

1. Pump Test: The pump manufacturer shall perform the following inspections and tests on each pump before shipment from factory:

   a. Impeller, motor rating, and electrical connections shall first be checked for compliance to the customer's purchase order.

   b. A motor and cable insulation test for moisture content or insulation defects.

c. Prior to submergence, the pump shall be run dry to establish correct rotation and mechanical integrity.

d. The pump shall be ran for 30 minutes submerged a minimum of 6 feet under water.

e. After Operational Test (d.), the Insulation Test (b.) is to be performed again.

2. A written report stating the foregoing have been done, shall be supplied with each pump at the time of shipment. The pump cable end will then be fitted with a shrink fit rubber boot to protect it prior to electrical installation.

D. Reference Standards: Comply with all applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. National Electrical Code (NEC).
2. National Electrical Manufacturers Association (NEMA)
3. Occupational Safety and Health Act (OSHA)
4. American Society of Testing and Materials (ASTM)
5. American Welding Society (AWS)
6. American Institute of Steel Construction (AISC)
7. American Society of Civil Engineers (ASCE)
8. Steel Structures Painting Council (SSPC)
9. American Gear Manufacturers Association (AGMA)
10. American National Standards Institute (ANSI)

1.07 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare all equipment according to the following:

1. Ensure that all the equipment is dry and protected.

2. Package all the equipment to protect from damage while in transport, loading, and unloading.

B. Storage:

1. Carefully prepare for storage and label all equipment and materials after they have been inspected.

2. Store materials to permit easy access for inspection and identification. Support all material off of the ground and protect steel members and package material from corrosion and deterioration as per manufacturer's instructions.

C. Handling: Handle all equipment as per manufacturer's instructions.

D. Inspect all equipment and materials against reviewed shop drawings at the time of delivery.

E. Equipment and materials damaged or not meeting the requirements of the reviewed shop drawings shall be immediately returned for replacement or repair.

1.08 COORDINATION

A. Coordinate Work on this section with interfacing and adjoining Work for proper sequencing of each installation.

B. A temporary bypass will be required during the lift station rehabilitation. The Contractor shall supply a means to bypass this lift station and the subsequent valve pit by plugging the line and installing temporary pumping equipment up stream of the lift station. At no time shall the sewer system be allowed to back up the lines a significant amount. Careful coordination shall occur to ensure no water backs up into basements, houses, or other structures.

C. During periods of heavy precipitation, surge flows should be expected to meet or exceed 2.5 mgd due to significant amounts of inflow and infiltration.

2.00 PRODUCTS

A. Shall be as specified herein.

2.01 GENERAL

A. The pump unit shall be suspended in such a manner that the pump discharge nozzle will be guided into the discharge pipe via two guide rails without it being necessary to manually mate the two pipes or necessary for a man to enter the basin and physically connect the two pipes. When the pump unit is in place, it shall be vertical and suspended in such a manner that the wastewater is fed in an upflow direction to the unit with no feet or other obstruction below the pump inlet.

B. All pumps shall be purchased from a single manufacturer, due to the design being such that pump units may be interchangeable. Should the proposed pumping equipment require supplemental sensors to validate warranty requirements (i.e.: seal leak detectors), such sensors and alarm indicators shall be provided at no additional cost to the Owner.

2.02 PUMPS

A. The pumps shall be capable of handling raw, unscreened sewage. The design shall be such that the pump unit will be automatically and firmly connected to the discharge connection, permanently installed in the wet well. The pump shall be easily removable for inspection or service, requiring no bolts, nuts or other fastenings to be disconnected. For this purpose, there shall be no need for personnel to enter the wet well. Each pump shall be fitted with a stainless steel lifting chain of adequate strength and length to permit raising and lowering the pump for inspection or removal. The pump, with its appurtenances and cable, shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet. The submersible pumps shall be capable of handling domestic sanitary sewage with three (3) inch solids and shall be self priming.

1. The pumps shall be FLYGT Models NP-3153.181HT3 and NP-3202.185HT3 submersible non-clog wastewater pumps.

2. Wet weather and dry weather flow pumps shall be equipped with a 45 and 20 horsepower motors respectively, 60 hertz motors, operating on 460 volt, 3-phase service turning at 1760 rpm. Discharge connection shall be 6" and 4" respectively. Appropriate mating eccentric increasers shall be provided to adapt pump discharge sizing to the wet well riser pipes.

2.03 PUMP CONSTRUCTION

A. Major pump components shall be of grey cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other irregularities. The lifting handle shall be of stainless steel. All exposed nuts or bolts shall be of stainless steel construction. All metal surfaces coming intocontact with the pumpage, other than stainless steel or brass, shall be protected by a factoryapplied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.

B. Sealing design shall incorporate **metal-to-metal contact** between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile O-rings. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific torque limit.

C. Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.

D. Each unit shall be provided with an integral motor cooling system. A stainless steel motor cooling jacket shall encircle the stator housing, providing for dissipation of motor heat regardless of the type of pump installation. An impeller, integral to the cooling system and driven by the pump shaft, shall provide the necessary circulation of the cooling liquid through the jacket. The cooling liquid shall pass about the stator housing in the closed loop system in turbulent flow providing for superior heat transfer. The cooling system shall have one fill port and one drain port integral to the cooling jacket. The cooling system shall provide for continuous pump operation in liquid or ambient temperatures of up to 104°F (40°C).

Operational restrictions at temperatures below 104°F are not acceptable. Fans, blowers or auxiliary cooling systems that are mounted external to the pump motor are not acceptable.

2.04 CABLE ENTRY SEAL

A. The cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal. The cable entry shall consist of dual cylindrical elastomer grommets, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter.

B. The grommets shall be compressed by the cable entry unit, thus providing a strain relief function. The assembly shall provide ease of changing the cable when necessary using the same entry seal. The cable entry junction chamber and motor shall be sealed from each other, which shall isolate the stator housing from foreign material gaining access through the pump top. Epoxies, silicones, or other secondary sealing systems shall not be considered equal.

2.05 MOTOR

A. The pump motor shall be a NEMA B design, induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber. The stator windings shall be insulated with moisture resistant Class H insulation rated for 180°C (356°F). The stator shall be insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95%. **The motor shall be inverter duty rated in accordance with NEMA MG1, Part 31**.The stator shall be heat-shrink fitted into the cast iron stator housing. The use of multiple step dip and bake-type stator insulation process is not acceptable. The use of pins, bolts, screws or other fastening devices used to locate or hold the stator and that penetrate the stator housing are not acceptable. The motor shall be designed for continuous duty while handling pumped media of up to 104°F. The motor shall be capable of no less than 30 evenly spaced starts per hour. The rotor bars and short circuit rings shall be made of aluminum. Three thermal switches shall be embedded in the stator end coils, one per phase winding, to monitor the stator temperature. These thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the motor control panel. The junction chamber shall be sealed off from the stator housing and shall contain a terminal board for connection of power and pilot sensor cables using threaded compression type terminals. The use of wire nuts or crimp-type connectors is not acceptable. The motor and the pump shall be produced by the same manufacturer.

B. The motor service factor (combined effect of voltage, frequency and specific gravity) shall be 1.15. The motor shall have a voltage tolerance of +/- 10%. The motor shall be designed for continuous operation in up to a 40°C ambient and shall have a NEMA Class B maximum operating temperature rise of 80°C. A motor performance chart shall be provided upon request exhibiting curves for motor torque, current, power factor, input/output kW and efficiency. The chart shall also include data on motor starting and no-load characteristics.

C. Motor horsepower shall be sufficient so that the pump is non-overloading throughout its entire performance curve, from shut-off to run-out. The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet or greater.

2.06 BEARINGS

A. The integral pump/motor shaft shall rotate on two bearings. The motor bearings shall be sealed and permanently grease lubricated with high temperature grease. The upper motor bearing shall be a two row angular contact ball bearing to handle radial loads. The lower bearing shall be a two row angular contact ball bearing to handle the thrust and radial forces. The minimum L_{10} bearing life shall be 50,000 hours at any usable portion of the pump curve.

2.07 MECHANICAL SEALS

A. Each pump shall be provided with a positively driven dual, tandem mechanical shaft seal system consisting of two seal sets, each having an independent spring. The lower primary seal, located between the pump and seal chamber, shall contain one stationary and one positively driven rotating corrosion and abrasion resistant tungsten-carbide ring. The upper secondary seal, located between the seal chamber and the seal inspection chamber shall be a leakage-free seal. The upper seal shall contain one stationary and one positively driven rotating corrosion and abrasion resistant tungsten-carbide seal ring. The rotating seal ring shall have small back-swept grooves laser inscribed upon its face to act as a pump as it

rotates, returning any fluid that should enter the dry motor chamber back into the lubricant chamber. All seal rings shall be individual solid sintered rings. Each seal interface shall be held in place by its own spring system. The seals shall not depend upon direction of rotation for sealing. Mounting of the lower seal on the impeller hub is not acceptable. Shaft seals without positively driven rotating members or conventional double mechanical seals containing either a common single or double spring acting between the upper and lower seal faces are not acceptable. The seal springs shall be isolated from the pumped media to prevent materials from packing around them, limiting their performance.

B. Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and shall provide capacity for lubricant expansion. The seal lubricant chamber shall have one drain and one inspection plug that are accessible from the exterior of the motor unit. The seal system shall not rely upon the pumped media for lubrication.

C. The area about the exterior of the lower mechanical seal in the cast iron housing shall have cast in an integral concentric spiral groove. This groove shall protect the seals by causing abrasive particulate entering the seal cavity to be forced out away from the seal due to centrifugal action.

D. A separate seal leakage chamber shall be provided so that any leakage that may occur past the upper, secondary mechanical seal will be captured prior to entry into the motor stator housing. Such seal leakage shall not contaminate the motor lower bearing. The leakage chamber shall be equipped with a float type switch that will signal if the chamber should reach 50% capacity.

2.08 PUMP SHAFT

A. The pump and motor shaft shall be a single piece unit. The pump shaft is an extension of the motor shaft. Shafts using mechanical couplings shall not be acceptable. The shaft shall be stainless steel – ASTM A479 S43100-T. Shaft sleeves will not be acceptable.

2.09 IMPELLER

A. The impeller shall be of **Hard-Iron™ (ASTM A-532** (Alloy III A) 25% chrome cast iron), dynamically balanced, semi-open, multi-vane, back swept, screw-shaped, non-clog design. The impeller leading edges shall be mechanically self-cleaned automatically upon each rotation as they pass across a spiral groove located on the volute suction. The leading edges of the impeller shall be hardened to Rc 60 and shall be capable of handling solids, fibrous materials, heavy sludge and other matter normally found in wastewater. The screw shape of the impeller inlet shall provide an inducing effect for the handling of up to 5% sludge and rag-laden wastewater. The impeller to volute clearance shall be readily adjustable by the means of a single trim screw. The impeller shall be locked to the shaft, held by an impeller bolt and shall be coated with alkyd resin primer.

2.10 VOLUTE / SUCTION COVER

A. The pump volute shall be a single piece gray cast iron, ASTM A-48, Class 35B, non-concentric design with smooth passages of sufficient size to pass any solids that may enter the impeller. Minimum inlet and discharge size shall be as specified. The volute shall have a replaceable suction cover insert ring in which are cast spiral-shaped, sharp-edged groove(s). The spiral groove(s) shall provide trash release pathways and sharp edge(s) across which each impeller vane leading edge shall cross during rotation so to remain unobstructed. **The insert ring shall be cast of Hard-Iron™** (ASTM A-532 (Alloy III A) 25% chrome cast iron) and provide effective sealing between the multi-vane semi-open impeller and the volute housing.

2.11 TERMINATION PANELS

A. Termination panels shall be provided at the Lift Station Wetwell location for termination of all pump power and controls wiring. The termination panel shall be NEMA 4X Stainless Steel construction with conduit seals placed on the control panel side of the termination panel pump terminals to assure ease of maintenance for the pumps. The junction box shall incorporate a 3 point latch with lockable handle.

2.12 CONTROL PANELS

A. Lift Station Controls and Control Panels shall be provided by the Control System Integrator as described in Section 13900 Control System Integration.

2.13 ACCESSORIES

A. Lifting Chains: The working load of the lifting system shall be a minimum of 50% greater than the pump weight. Pump lifting chains shall be sized and provided by the pump manufacturer. The chain shall be sized to accommodate the installed pump weight and shall be type 316 stainless steel. The chain length shall be five feet greater than the station depth.

B. Guides:

1. Furnish and install four stainless steel upper guide holder and sufficient stainless steel level senor cable holders. The upper guide holder shall be securely mounted above the pumps. Lower guide bar holders shall be integral with the discharge connection; guide bars shall be stainless steel pipe of the size indicated on the drawings. Two guide bars are required for each pump and shall not support any portion of the weight of the pump. Guide bars and discharge connection shall be furnished and installed for all four pumps.

C. Liquid Level Control: A Multitrode Model 84-800103 shall be installed and shall supply the level sensing function required to control the pumps.

1. A float system shall also be provided for back-up pump control. The floats shall be restrained using stainless steel brackets at 4' intervals to prevent the floats from becoming entangled.

D. Cable Supports: All of the pump power/sensor electrical cables and the float cables shall be provided with a stainless steel grips constructed of 300 series stainless steel. The pump supplier shall determine the actual size of the grips and supply the grips with the pumps.

E. All piping, valves, and fittings to complete the lift station shall be installed as shown on the drawings.

3.00 EXECUTION

3.01 GENERAL

A. The pump unit shall arrive at the job site ready for installation. The hookup to the sewer shall conform to the drawings and the specifications. The Contractor shall be responsible for furnishing and installing units of the depth as shown on the drawings.

B. Equipment Manufacturer:

1. All fabricated steel parts (excluding stainless steel) shall be commercially cleaned and given one (1) shop coat of rust inhibitive primer to be compatible with the final coat of paint. See Section 09900, Paints and Coatings.

2. All items such as motors, reducers, and equipment completely shop assembled and ready for installation shall be given one (1) coat of the manufacturer's machinery enamel.

C. General Contractor:

1. The General Contractor shall furnish and install all piping as shown on the drawings.

2. The General Contractor shall furnish and install all field wiring required including proper sized wire, conduit, fittings, and supports.

3. The General Contractor shall furnish and install all electrical items required but not specifically called for as furnished by the equipment manufacturer.

4. The General Contractor shall furnish and apply all touch-up of the prime coat and all finish coatings; and be responsible for compatibility of the primer with finish coatings.

5. The General Contractor shall place the anchorage in accordance with certified prints supplied by the equipment manufacturer.

6. The General Contractor shall be responsible for furnishing all equipment necessary to bypass the raw sewage around the lift station during the rehabilitation. The Contractor shall submit the proposed bypass plans for review and approval by the Engineer. The Engineer reserves the right to modify the proposed bypass plan.

3.02 ELECTRICAL INSTALLATION

A. All wiring shall be in complete conformity with the National Electric Code and state and local NEMA standards.

B. The entire installation of the pumps, electrical connections and any other work associated therewith shall adhere to the manufacturer's instructions, and shall be in compliance with all applicable codes.

3.03 CORROSION PROTECTION

A. Non-stainless steel portions of the pump casting and appurtenant iron castings shall be pretreated with all metal surfaces coming into contact with the pumpage, other than stainless steel or brass, shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.

B. The interior of the pump volute and passageways shall be painted.

C. All other surfaces susceptible to corrosion shall be coated as described in Section 09900.

3.04 FIELD TESTING

A. The Contractor shall, at his own expense, provide the necessary facilities to provide hydraulic and electrical performance tests on each of the pumps as shipped and/or assembled on the construction site.

B. The specifications for hydraulic and electrical characteristics as stated elsewhere in this section are minimum requirements. Any pump failing to meet the minimum requirements shall be rejected. All rejected equipment shall be removed from this project and substituted with brand new merchandise.

C. The performance test instruments to be used shall measure amperes, volts, feet of head, and flow. The instruments used shall have full scale accuracy of at least 1.5%. The minimum number of instruments required are one each with ranges so indicated:

1. Ampere meter, ranges 0 to 20 amperes, and 0 to 100 amperes, direct reading, clamp on type.

2. Volt meter, direct reading capable of reading 0 to 500 volts.

D. The Contractor may elect for a properly equipped independent testing laboratory to perform the required performance testing. The Contractor shall submit to the Engineer a list of gauges and meters to be used in the testing and drawings of the proposed layout for performing the test, prior to testing for his approval. The Contractor shall notify the Engineer no less than 24 hours prior to when testing is to be done.

E. Each pump may be subjected to a 24-hour operation test before acceptance as follows:

1. Preparation: The unit under test shall be properly installed in the wet well, firmly upon its discharge connection after determination (a) proper service voltage is being supplied and (b) proper rotation of the impeller. No cooling by forced or circulated air shall be allowed.

2. Dry pumping test (all sizes): Liquid shall be at a level sufficient to keep the pump volute submerged during the test. Pump shall be operated at full load for one hour unsubmerged without failure or damage to the windings.

3. Supplier may be allowed to provide independent documentation of such capabilities. The use of thermal sensors to protect the motor shall not be considered as an acceptable means of meeting this requirement.

3.05 LIMITED WARRANTY

A. The furnished equipment shall be guaranteed against defects in materials or workmanship for a minimum period of five (5) years following date of start-up. During the warranty period, all defective equipment shall be repaired or replaced without cost or obligation to the Owner the first year, with a stair stepped warranty for the remaining four years. A written policy shall be supplied to the Owner.

END OF SECTION 11850

SECTION 13270 - ENERGY EFFICIENT TRANSFORMERS

1.00 GENERAL

1.01 SECTION INCLUDES

A. Dry-type energy efficient transformers per NEMA TP1, with primary and secondary voltages of 600V and less and capacity ratings 15kVA through 750kVA.

1.02 REFERENCES

A. NFPA 70 - National Electrical Code
B. NEMA ST20
C. UL 1561
D. NEMA TP1
E. NEMA TP2

1.03 SUBMITTALS

A. Suppliers asking consideration as an approved equal shall submit complete, warranted performance data and physical dimensions for similar transformers. Data shall be submitted for each size specified, and shall be received by the consultant engineer no less than 10 days prior to the bid due date for consideration.

1.04 STANDARDS

A. Transformers 750kVA and smaller shall be listed by Underwriters Laboratories.
B. Conform to the requirements of ANSI/NFPA 70.
C. Transformers are to be manufactured and tested in accordance with NEMA ST20.
D. Transformers losses shall conform to NEMA TP1 requirements
E. Transformers losses shall be tested in accord with NEMA TP2 procedures

2.00 PRODUCTS

2.01 MANUFACTURERS

A. Transformers shall be as manufactured by Square D Company or approved equal.
B. Approved manufacturers shall be registered firms in accordance with ISO 9001:1994 SIC 3612 (US); which is the design and manufacture of low voltage dry type power, distribution and specialty transformers.

2.02 RATINGS INFORMATION

A. All insulating materials are to exceed NEMA ST20 standards and be rated for 220°C UL component recognized insulation system.
B. Transformers 15kVA and larger shall be 150°C temperature rise above 40°C ambient. Transformers 25kVA and larger shall have a minimum of 4 - 2.5% full capacity primary taps. Exact voltages and taps to be as designated on the plans or the transformer schedule.
C. The maximum temperature of the top of the enclosure shall not exceed 50°C rise above a 40°C ambient.

D. Transformers shall be low loss type with minimum efficiences per NEMA TP1 when operated at 35% of full load capacity. Efficiency shall be tested in accord with NEMA TP2.

Single Phase		Three Phase	
kVA	Efficiency	kVA	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%

E. The transformer(s) shall be rated as indicated in the following schedule:

Identification Number(s)
kVA Rating
Voltages
Phase
Frequency

2.03 CONSTRUCTION

A. Transformer coils shall be of the continuous wound construction and shall be impregnated with nonhygroscopic, thermosetting varnish

B. All cores to 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.

C. 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.

D. 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 degeasing, 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.

2.04 SOUND LEVELS

A. Sound levels shall be warranted by the manufacturer not to exceed the following:

15 to 50KVA - 45dB; 51 to 150kVA - 50dB; 151 to 300kVA - 55dB; 301 to 500kVA - 60dB; 501 to 700kVA - 62dB; 701 to 1000kVA - 64dB; 1001 to 1500kVA - 65dB; 1501 to 2000kVA- 66dB

3.00 EXECUTION

3.01 INSTALLATION OF TRANSFORMERS

A. Install transformers as indicated, complying with manufacturer's written instructions, applicable requirements of NEC, NESC, NEMA, ANSI and IEEE standards, and in accordance with recognized industry practices to ensure that products fulfill requirements.

B. Install units on vibration mounts; comply with manufacturer's indicated installation method, if any.

C. Connect transformer units to electrical wiring system comply with requirements of other Division 16 sections.

D. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Std. 486A and B.

3.02 GROUNDING

A. Provide equipment grounding connections for power/distribution transformers as indicated. Tighten connections to comply with tightening torques specified in UL Std. 486A to assure permanent and effective grounding.

3.03 TESTING

A. Prior to energization of transformers, check all accessible connections for compliance with manufacturer's torque tightening specifications.

B. Prior to energization, check circuitry for electrical continuity, and for short-circuits.

C. Upon completion of installation of transformers, energize primary circuitry at rated voltage and frequency from normal power source, and test transformers, including, but not limited to, audible sound levels, to test capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to for compliance; otherwise, remove and replace with new units or components, and proceed with retesting.

END OF SECTION

DIVISION 13 – SPECIAL CONSTRUCTION

SECTION 13410 – ELECTROMAGNETIC FLOW METER

1.00 GENERAL

a. Section 13410 shall be deleted and considered Null and Void. Refer to Section 13910, 2.01 , for meter specifications. per add # 1

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Special Conditions and Division 1 specification section, apply to this section.

1.02 SUMMARY

A. The Contractor shall furnish, install and place in satisfactory operating condition the flow monitoring equipment and appurtenances as shown on the drawings and described in the specifications.

B. This section covers the flow monitoring equipment including:

1. Influent Mag Meter

1.03 Related sections include the following:

1. 02080 Utility Materials
2. 16010 General Electrical Requirements

1.04 PERFORMANCE REQUIREMENTS

A. Design Summary: Flow meters shall be placed to measure the following:

1. Meter Installation
2. Mag Meter – 10" Diameter and 8" Diameter
3. Meter shall be Ultra Mag Model UM08 or equal.
4. Meter shall be capable of sustained submersion without affecting accuracy.

1.05 SUBMITTALS

A. Product Data: Include the following for each different piece of equipment called for in this section:

1. Product literature
2. Manuals
3. Complete product description
4. Affidavits of compliance with referenced standards and codes.
5. Manufacturer's warranty
6. A list of all deviations from drawings and specifications.

B. Shop Drawings: All shop drawing submittals shall be in accordance with the General Conditions and Division 1 and include the following:

1. Dimensions and required clearances
2. Layout for all equipment including installation details

C. Operation and Maintenance Data: Two (2) copies of each manufacturer's Maintenance and Operating Instructions Manual shall be provided with the equipment at the time of delivery. Three (3) copies that include all revisions made during start-up shall be provided after final acceptance.

1.06 QUALITY ASSURANCE

A. In order to assure uniform quality, ease of maintenance and minimal parts storage, it is the intent of these specifications that the flow meters called for under this section shall be supplied by a single manufacturer. All equipment manufacturers shall, in addition to the Contractor, assume the responsibility for proper installation and functioning of the equipment supplied by them.

B. The Contract Documents represent the minimum acceptable standards for equipment specified in this section on this project. All equipment shall conform fully in every respect to the requirements of the respective parts and sections of the drawings and specifications. If not named, the equipment which is a "standard product" with the manufacturer shall be modified, redesigned from the standard mode and shall be furnished with special features, accessories, materials of construction or finishes as may be necessary to conform to the quality mandated by the technical and performance requirements of the specification.

C. Factory Tests: Manufacturer shall factory assemble equipment to detect any defects and demonstrate that they will function satisfactory under all conditions specified. Manufacturer shall prepare and submit a written report on the results of remedial action taken, if any.

D. Reference Standards: Comply with all applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. National Electrical Code (NEC).
2. National Electrical Manufacturers Association (NEMA)
3. Occupational Safety and Health Act (OSHA)
4. American Society of Testing and Materials (ASTM)
5. American Welding Society (AWS)
6. American Institute of Steel Construction (AISC)
7. American Society of Civil Engineers (ASCE)
8. Steel Structures Painting Council (SSPC)
9. American National Standards Institute (ANSI)
10. American Water Works association (AWWA)

1.07 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare all equipment according to the following:

1. Ensure that all the equipment is dry and protected.
2. Package all the equipment to protect from damage while in transport, loading, and unloading.

B. Storage:

1. Carefully prepare for storage and label all equipment and materials after they have been inspected.
2. Store materials to permit easy access for inspection and identification. Support all material off of the ground and protect steel members and package material from corrosion and deterioration as per manufacturer's instructions.

C. Handling: Handle all equipment as per manufacturer's instructions.

D. Inspect all equipment and materials against reviewed shop drawings at the time of delivery.

E. Equipment and materials damaged or not meeting the requirements of the reviewed shop drawings shall be immediately returned for replacement or repair.

2.00 PRODUCTS

2.01 MANUFACTURERS

A. The manufacturer must meet all the requirements as specified herein and as indicated on the drawings.

B. Manufacturer's Qualifications: All manufacturers shall assume complete responsibility for the design and performance of the equipment supplied by them.

C. The manufacturer(s) of the equipment specified in this section shall meet one (1) of the following requirements:

1. Have a minimum of five (5) years experience in producing equipment specified in this section and shall produce evidence of at least five (5) installations of similar size in satisfactory operation in the United States.

2. Submit a bond or cash deposit, which will guarantee replacement of the equipment specified in this section in the event of failure. The guarantee bond or cash deposit is required for five (5) years from the date of Owner acceptance of the equipment. Equipment, which does not meet the experience clause and is proposed under these conditions, must meet all technical requirements.

2.02 METER INSTALLATION

A. Meter shall be a velocity sensing electromagnetic type with microprocessor based signal converter, sealed housing, flanged tube meter for 300-psi working pressure and CSA approved. The meters shall be McCrometer flanged model UM 08 or preapproved alternate. The meters shall be eight inch (8") as shown on the plans. They shall have a range of 33 to 7,677 gpm. The indicator shall be equipped with six-digit digital totalizer reading in units of 1000 gallons and shall be accurate within 0.5% of true flow. The meter assembly shall operate within a range of 0.2 FPS to 49 FPS and be constructed as follows:

B. Meter Tube (Sensor) shall be fabricated stainless steel pipe and use 300-lb. AWWA Class "D: flat face steel flanges. The internal and external of the meter tube shall be blasted to near white metal and lined with 40 mils of NSF approved fusion bonded epoxy coating, applied by the fluidized bed method. Meter tubes shall have a constant nominal inside diameter offering no obstruction to the flow. Electrodes shall be 316 stainless steel.

C. Mag Shield shall be welded to the tube providing a completely sealed environment for all coils, electrode connections and wiring harness capable of submerged or buried operation (NEMA 6P). Connection cable shall also be rated for submerged conditions. Fifty feet (50') of cable shall be furnished.

D. Signal Converter (Indicator/transmitter) shall be pulsed dc coil excitation type with auto zeroing. The signal converter shall be remotely mounted away from the meter. The converter shall indicate direction of flow and provide a flow rate indication and a totalization of flow volume for both forward and reverse directions. Both forward and reverse totalizers shall be electronically resettable. The converter shall provide an isolated 4-20 mA output in 800-ohm load, and a frequency output of a maximum of 0-800 Hz and a scaled pulse output. The microprocessor based signal converter shall have a self-diagnostic test mode and a backlit display that continuously displays "Rate of Flow" and "Total Volume". The signal converter configuration parameters shall be lockout protected, but can be changed via the front panel keypad or with the use of a personal computer or electronic organizer with a 9-pin RS232 serial interface port. The converter shall be compatible with Microsoft Windows and other software programs with built in terminal communication capabilities. The converter shall be remotely mounted up to 300-ft. from sensor, and shall be supplied in a sealed NEMA 4X case, with all calibration complete for desired requirements. Converter shall be supplied with a programmable low flow drop out and empty pipe zero return.

E. Grounding Rings shall be 316 stainless steel and two shall be supplied with each meter tube.

F. Volumetric Testing of all meters must be performed and approved prior to shipment. The complete meter assembly and signal converter must be wet accuracy tested and calibrated as a unit near minimum, intermediate, and maximum manufacturer's specified flow ranges of the meter. The amount of water used to conduct the test must be shown on a shipping tag attached to the meter. The test facility must be certified

annually to accuracy of +0.2% and be traceable to the National Institute of Standards and Technology. If desired, the test shall be witnessed by the Owner or their selected agent. A copy of the certified accuracy test record must be furnished at no charge to the Owner, if requested.

G. Warranty Meters shall be warranted for a period of 2 years from the date of manufacturer.

3.00 EXECUTION

3.01 INSTALLATION

A. Install all equipment specified in this section as indicated on the contract drawings and in accordance with the manufacturer's instructions. The Contractor shall field verify all dimensions and provide piping and fittings to properly fit the meter into the piping. All piping and meters shall fit together in true alignment.

B. The Contractor shall furnish and install all field wiring, including indicator wires, required including proper sized wire, conduit, fittings, and supports, as called for on the plans and specified in Division 16.

C. Provide the Owner with an installation certificate signed by the equipment manufacturer's representative attesting that the equipment has been properly installed and is ready for start-up and continuous operation.

3.02 FIELD QUALITY CONTROL

A. Each manufacturer of the electronic equipment called for in this section shall provide a qualified field serviceman for a minimum period of one (1) day with one (1) trip to perform the following services:

1. Equipment installation:

   a) Inspect the completed installation and note deficiencies, if any.
   b) Assist Owner and Contractor during start-up, and adjusting of completed installation.

2. Training:

   a) Instruct personnel in the operating and maintenance of the equipment, provided under this item.
   b) All procedures shall be covered including preventative maintenance, method of controlling equipment, and troubleshooting.

3.03 WARRANTY

A. Warranty all parts to be free from defects in material and workmanship for a period of two years after start-up of the equipment specified in this section. Furnish and install replacement parts found to be defective within the defined two year warranty period.

END OF SECTION 13410

SECTION 13442 - PANELBOARDS

1.00 GENERAL

1.01 SUMMARY

A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for panelboards with branch metering as required for the complete performance of the work, and as shown on the Drawings and as herein specified.

B. Section Includes: The work specified in this Section includes, but shall not be limited to, the following:

1. Provide lighting and appliance panelboards as specified herein and where shown and scheduled on the Drawings.

C. Related Sections: Related sections include, but shall not be limited to, the following:

1. Section 13476 - Transient Voltage Surge Suppression.

1.02 REFERENCES

A. General: The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

B. Canadian Standards Association (CSA):

1. CSA C22.2 No. 5, "Molded Case Circuit Breakers, Molded Case Switches and Circuit Breaker Enclosures."

2. CSA C22.2 No. 29, "Panelboards and Enclosed Panelboards."

C. Federal Specifications (FS):

1. FS W-C-375, "Circuit Breakers, Molded Case, Branch Circuit and Service."

2. FS W-P-115, "Panel, Power Distribution."

D. National Electrical Manufacturers Association (NEMA):

1. NEMA AB 1, "Molded Case Circuit Breakers and Molded Case Switches."

2. NEMA PB 1, "Panelboards."

3. NEMA PB 1.1, "General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less."

E. National Fire Protection Association (NFPA):

1. NFPA 70, "National Electrical Code," hereinafter referred to as NEC.

F. Underwriters Laboratories, Inc. (UL):

1. UL 50, "Enclosures for Electrical Equipment, Non-Environmental Considerations."

2. UL 67, "Standard for Panelboards."

3. UL 489, "Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures."

1.03 SUBMITTALS

A. General: See [Section 01 33 00 - Submittal Procedures] [Section 01300 - Submittals].

B. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications.

C. Shop Drawings: Submit shop drawings for each product and accessory required. Include information not fully detailed in manufacturer's standard product data. Shop drawings shall contain overall panelboard dimensions, interior mounting dimensions, and wiring gutter dimensions. The location of the main, branches, and solid neutral shall be clearly shown. In addition, the shop drawing shall illustrate one-line diagrams with applicable voltage systems.

D. Wiring Diagrams: Submit wiring diagrams detailing power, signal, and control systems, clearly differentiating between manufacturer-installed wiring and field-installed wiring, and between components provided by the manufacturer and those provided by others.

E. Operation and Maintenance Data: Submit operation and maintenance data for panelboards with branch metering to include in operation and maintenance manuals.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Manufacturer shall be a firm engaged in the manufacture of panelboards with branch metering of types and sizes required, and whose products have been in satisfactory use in similar service for a minimum of five years.

2. Installer Qualifications: Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing panelboards with branch metering similar in type and scope to that required for this Project and shall be approved by the manufacturer.

B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

1. Without limiting the generality of other requirements of this Section, all work specified herein shall conform to or exceed the applicable requirements of the following standards; provided, that wherever the provisions of said publications are in conflict with the requirements specified herein, the more stringent requirements shall apply:

a. CSA C22.2 No. 5.

b. CSA C22.2 No. 29.

c. FS W-C-375.

d. FS W-P-115 (Type I, Class 1).

e. NEMA AB 1.

f. NEMA PB 1.

g. NEMA PB 1.1.

h. NEC.

i. UL 50.

j. UL 67.

k. UL 489.

C. Single Source Responsibility: Obtain panelboards and required accessories from a single source with resources to produce products of consistent quality in appearance and physical properties without delaying the work. Any materials which are not produced by the manufacturer shall be acceptable to and approved by the manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if any.

B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.06 WARRANTY

A. Special Warranty: Submit a written warranty executed by the manufacturer, the Installer, and the Contractor, agreeing to repair or replace panelboards with branch metering that fail in materials or workmanship within the specified warranty period.

1. Warranty Period: Warranty period shall be one year from the date of installation or 18 months from date of purchase.

2.00 PRODUCTS

2.01 MANUFACTURERS

A. Product specified shall be "NQ (Class 1640)" or "NQOD (Class 1630)" as manufactured by Square D by Schneider Electric. Items specified are to establish a standard of quality for design, function, materials, and appearance. Equivalent products by other manufacturers are acceptable. The Design Professional will be the sole judge of the basis of what is equivalent.

1. Substitutions shall be submitted in writing three weeks prior to original bid date with supporting documentation demonstrating that the alternate manufacturer meets all aspects of the Section herein.

2.02 MATERIALS AND COMPONENTS

A. Lighting and Appliance Panelboard Type:

1. NQ or NQOD:

   a. Interior:

      1) Shall be Type NQ or NQOD panelboard rated for 240 volts AC maximum. Continuous main current ratings, as indicated and scheduled on the Drawings, shall not exceed 600 amperes maximum.

      2) Minimum short circuit current rating shall be 22,000 in rms symmetrical amperes at 240 volts AC.

      3) Provide one continuous bus bar per phase. Each bus bar shall have sequentially phased branch circuit connectors suitable for plug-on or bolt-on branch circuit breakers. The bussing shall be fully rated. Panelboard bus current ratings shall be determined by heat-rise tests conducted in accordance with UL 67. Bussing rated 100 to 400 amperes shall be plated [copper] [aluminum]. Bussing rated for 600 amperes shall be plated copper as standard construction. Bus bar plating shall run the entire length of the bus bar. Panelboards shall be suitable for use as service equipment when application requirements comply with UL 67 and NEC Articles 230-F and 230-G.

      4) Current carrying parts shall be insulated from ground and phase-to-phase by high dielectric strength thermoplastic.

      5) A solidly bonded aluminum equipment ground bar shall be provided.

      6) Split solid neutral shall be plated and located in the mains compartment up to 225 amperes so incoming neutral cable may be of the same length.

      7) Interior trim shall be of deadfront construction to shield user from energized parts. Deadfront trim shall have filler plates covering unused mounting spaces.

      8) Nameplates shall contain system information and catalog number or factory order number. Interior wiring diagram, neutral wiring diagram, CSA and UL-listed label, and short circuit current rating shall be displayed on the interior or in a booklet format.

      9) Interiors shall be field convertible for top or bottom incoming feed. Main circuit breakers in 100 ampere interiors shall be [horizontally] [vertically] mounted. Main circuit breakers over 100 amperes shall be vertically mounted. Sub-feed circuit breakers shall be vertically mounted. Main lug interiors up to 400 amperes shall be field convertible to main circuit breaker. Interior leveling provisions shall be provided for flush-mounted applications.

      10) Interior phase bus shall be pre-drilled to accommodate field installable options (NQ only) (i.e., sub-feed lugs, sub-feed circuit breakers, thru-feed lugs, etc.).

   b. Main Circuit Breaker:

      1) Shall be Square D type circuit breakers.

      2) Main circuit breakers shall have an overcenter, trip-free, toggle mechanism which shall provide quick-make, quick-break contact action. Circuit breakers shall have a permanent trip unit with thermal and magnetic trip elements in each pole. Each thermal element shall be true rms sensing and shall be factory calibrated to operate in a 40 degree C ambient environment. Thermal elements shall be ambient compensating above 40 degrees C.

3) Two-pole and three-pole circuit breakers shall have common tripping of all poles. Circuit breaker frame sizes above 100 amperes shall have a single magnetic trip adjustment located on the front of the circuit breaker that shall allow the user to simultaneously select the desired trip level of all poles. Circuit breakers shall have a push-to-trip button for maintenance and testing purposes.

4) Circuit breaker handle and faceplate shall indicate rated ampacity. Standard construction circuit breakers shall be CSA and UL-listed for reverse connection without restrictive line or load markings.

5) Circuit breaker escutcheon shall have international I/O markings, in addition to standard on/off markings. Circuit breaker handle accessories shall provide provisions for locking handle in the on or off position.

6) Lugs shall be CSA and UL-listed to accept solid or stranded [copper and aluminum conductors] [copper conductors only]. Lugs shall be suitable for [75 degree C rated wire] [90 degree C rated wire, sized according to the 75 degree C temperature rating per NEC Table 310-16]. Lug body shall be bolted in place. Snap-in designs are not acceptable.

7) The circuit breakers shall be CSA and UL-listed for use with the following accessories:

   a) Under voltage trip.

   b) Mechanical lug kits.

c. Branch Circuit Breakers:

1) Shall be Square D type circuit breakers. Circuit breakers shall be CSA and UL-listed with amperage ratings, interrupting ratings, and number of poles as indicated and scheduled on the Drawings.

2) Molded case branch circuit breakers shall have [bolt-on] type bus connectors.

3) Circuit breakers shall have an overcenter toggle mechanism which shall provide quick-make, quick-break contact action. Circuit breakers shall have thermal and magnetic trip elements in each pole. Two-pole and three-pole circuit breakers shall have common tripping of all poles.

4) There shall be two forms of visible trip indication. The circuit breaker handle shall reside in a position between on and off. In addition, there shall be a red Visi-Trip indicator appearing in the clear window of the circuit breaker housing.

5) The exposed faceplates of branch circuit breakers shall be flush with one another.

6) Lugs shall be UL-listed to accept solid or stranded copper conductors only. Lugs shall be suitable for 90 degree C rated wire, sized according to the 75 degrees C temperature rating per NEC Table 310-16.

7) Circuit breakers shall be CSA and UL-listed for use with the following factory installed accessories:

   a) Shunt trip.

   b) Auxiliary switch.

c) Alarm switch.

d. Enclosures:

1) Type 1 Boxes:

a) Boxes shall be hot-dip zinc galvanized steel constructed in accordance with UL 50 requirements. Unpainted galvannealed steel is not acceptable.

b) Boxes shall have removable endwalls with knockouts located on one end. Boxes shall have welded interior mounting studs. Interior mounting brackets are not required.

c) Box width shall be 26 inches (660 mm) wide maximum.

2) Type 1 Fronts:

a) Front shall meet strength and rigidity requirements per UL 50 standards. Front shall have ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.

b) Fronts shall be hinged one-piece with door. Mounting shall be surface as indicated and scheduled on the Drawings.

c) Panelboards shall have mono-flat fronts with concealed door hinges and mounted with trim screws. Front shall not be removable with the door locked. Doors on front shall have rounded corners and edges shall be free of burrs.

d) Front shall have cylindrical tumbler type lock with catch and spring-loaded stainless steel door pull. Lock assemblies shall be keyed alike. One key shall be provided with each lock. A clear plastic directory cardholder shall be mounted on the inside of door.

3) Types 3R, 4, and 12:

a) Enclosures shall be constructed in accordance with UL 50 requirements. Enclosures shall be painted with ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.

b) Doors shall be gasketed and equipped with a tumbler type vault lock and two additional quarter turn fasteners on enclosures 59 inches (1499 mm) or more in height. Lock assemblies shall be keyed alike. One key shall be provided with each lock. A clear plastic directory cardholder shall be mounted on the inside of door.

c) Maximum enclosure dimensions shall not exceed 21 inches (533 mm) wide and 6.5 inches (165 mm) deep.

3.00 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Engineer, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until

unsatisfactory conditions have been corrected.

1. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.02 INSTALLATION

A. General: Install panelboards with branch metering in accordance with reviewed product data, final shop drawings, manufacturer's written instructions and recommendations, and as indicated on the Drawings.

1. Install panelboards with branch metering in accordance with manufacturer's written instructions, NEMA PB 1.1, and NEC standards.

2. Install and configure software in accordance with manufacturer's written instructions.

3.03 FIELD QUALITY CONTROL

A. Inspect complete installation for physical damage, proper alignment, anchorage, and grounding.

B. Measure steady state load currents at each panelboard feeder. Rearrange circuits in the panelboard to balance the phase loads within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

C. Check tightness of bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written specifications.

3.04 DEMONSTRATION

A. Provide the services of a factory-authorized service representative of the manufacturer to provide start-up service and to demonstrate and train the Owner's personnel.

1. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

2. Train the Owner's maintenance personnel on procedures and schedules related to start-up and shutdown, troubleshooting, servicing, and preventive maintenance.

3. Review data in operation and maintenance manuals with the Owner's personnel.

4. Schedule training with the Owner, through the Engineer, with at least seven day's advanced notice.

3.05 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to the Installer, that shall ensure that the panelboards with branch metering shall be without damage at time of Substantial Completion.

END OF SECTION

DIVISION 13

SECTION 13443 – MOTOR CONTROL CENTER

1.00 GENERAL

1.01 SUMMARY

A. Section Includes: This section includes, but shall not be limited to, requirements for a motor control center (MCC) and required control devices as shown on the Drawings and specified to be part of the MCC equipment. The MCC shall be 277/480 volt, 3-phase, 3-wire, 60 hertz.

1.02 REFERENCES

A General: The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

B. American National Standards Institute (ANSI):

1. ANSI Z55.1, "Gray Finishes for Industrial Apparatus and Equipment."

C. ASTM International (ASTM):

1. ASTM B117, "Standard Practice for Operating Salt Spray (Fog) Apparatus."

D. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

1. IEEE 519, "Guide for Harmonic Control and Reactive Compensation of Static Power Converters."

E. International Electrotechnical Commission (IEC):

1. IEC 60947, "Low Voltage Switchgear and Control Gear - Part 2: Circuit Breakers."

F. International Organization for Standardization (ISO):

1. ISO 9001, "Quality Management Systems - Requirements."

G. Military Standardization Documents (MIL):

1. MIL-STD-202, "Test Methods for Electronic and Electrical Component Parts."

H. National Electrical Manufacturers Association (NEMA):

1. NEMA ICS 18, "Motor Control Centers."

I. National Fire Protection Association (NFPA):

1. NFPA 70, "National Electrical Code," hereinafter referred to as NEC.

J. SAE International (SAE):

1. SAE H1738-2, "Specification for Mini, Micro, and Nano Plugs and Receptacles."

K. Underwriters Laboratories, Inc. (UL):

1. UL 50, "Enclosures for Electrical Equipment, Non-Environmental Considerations."

1. UL 498, "Standard for Attachment Plugs and Receptacles."

1. UL 508, "Standard for Industrial Control Equipment."

1. UL 845, "Motor Control Centers."

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of the Contract and Division 01 - General Requirements.

B. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications.

C. Shop Drawings: Submit shop drawings for each product and accessory required. Include information not fully detailed in manufacturer's standard product data.

D. Wiring Diagrams: Submit wiring diagrams detailing power, signal, and control systems, clearly differentiating between manufacturer-installed wiring and field-installed wiring, and between components provided by the manufacturer and those provided by others.

E. Operation and Maintenance Manuals: Submit with the delivery of the MCC an operation and maintenance manual and one copy of the manufacturer's drawings per shipping block.

F. Cutover Execution Plan: The Contractor and Control System Integrator shall be responsible for submitting a Cutover Execution Plan for the MCC replacement.

The following loads are to be considered critical loads with downtime minimized and addressed:

1. RAS Pumps

2. Aeration Blowers

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Manufacturer shall be a firm engaged in the manufacture of low voltage industrial MCCs of types and sizes required, and whose products have been in satisfactory use in similar service for a minimum of five years.

2. Installer Qualifications: Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing low voltage industrial MCCs similar in type and scope to that required for this Project and shall be approved by the manufacturer.

B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

1. The MCC shall conform to UL 845, current revision, Canadian Standards Association (CSA), Electrical Equipment Manufacturers Association of Canada (EEMAC), NEMA ICS 18, the NEC, and the Canadian Electrical Code. The MCC shall be manufactured in an ISO 9001 certified facility.

C. Single Source Responsibility: Obtain low voltage industrial MCCs and required accessories from a single source with resources to produce products of consistent quality in appearance and physical properties without delaying the work.

1.05 DELIVERY, STORAGE, AND HANDLING

A. The MCC shall be separated into shipping blocks no more than three vertical sections each. Shipping blocks shall be shipped on their sides to permit easier handling at the job site. Each shipping block shall include, but shall not be limited to, a removable lifting angle, which shall allow an easy means of attaching an overhead crane or other suitable lifting equipment.

B. If the MCC cannot be placed into service reasonably soon after its receipt, store it in a clean, dry, and ventilated building free from temperature extremes. Acceptable storage temperatures are from 32 degrees F (0 degrees C) to 104 degrees F (40 degrees C).

1.06 WARRANTY

A. The MCC shall be warranted to be free from defects in materials and workmanship for a period of 18 months from date of invoice from manufacturer or authorized sales channel.

B. The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents

2.00 PRODUCTS

2.01 MANUFACTURERS

A. Shall be Square D® brand or equal.

2.02 MATERIALS

A. Steel material shall comply with UL 845 and CSA requirements.

B. Each MCC shall consist of one or more vertical sections of heavy gage steel bolted together to form a rigid, freestanding assembly. A removable 7 gage structural steel lifting angle shall be mounted full width of the MCC shipping block at the top. Removable 7 gage bottom channel sills shall be mounted underneath front and rear of the vertical sections extending the full width of the shipping block. Vertical sections shall be made of welded side-frame assembly formed from a minimum of 12 gage steel. Internal reinforcement structural parts shall be of 12 gage and 14 gage steel to provide a strong, rigid assembly. The entire assembly shall be constructed and packaged to withstand normal stresses included in transit and during installation.

2.03 MCC FINISH

A. Steel parts shall be provided with UL and CSA listed acrylic/alkyd baked enamel paint finish or triglycidyl isocyanurate (TGIC) powder coat, except plated parts used for ground connections. Painted parts shall undergo a multi-stage treatment process, followed by the finishing paint coat.

B. Pre-treatment shall include, but shall not be limited to, the following:

1. Hot alkaline cleaner to remove grease and oil.

2. Iron phosphate treatment to improve adhesion and corrosion resistance.

C. The paint shall be applied using an electro-deposition process to ensure a uniform paint coat with high adhesion.

D. The standard paint finish shall be tested to UL 50 per ASTM B117 (5 percent ASTM salt spray) with no greater than 0.125 inch (3.18 mm) loss of paint from a scribed line.

E. Paint color shall be #49 medium light gray per ANSI Z55.1 (60 to 70 gloss) on all surfaces unless specified otherwise. Control station plates and escutcheon plates shall be painted a contrasting gray. Unit interior saddles shall be painted white for better visibility inside the unit.

2.04 STRUCTURES

A. Structures shall be totally enclosed, deadfront, freestanding assemblies. Structures shall be capable of being bolted together to form a single assembly.

B. The overall height of the MCC shall not exceed 90 inches (2286 mm), not including base channel or lifting angle. Base channels, 1.5 inches (38 mm) in height, and lifting angles, 3 inches (76 mm) in height, shall be removable. The total width of one section shall be 20 inches (508 mm). Widths of 25 inches (635 mm), 30 inches (762 mm), and 35 inches (889 mm) can be used for larger devices.

C. Structures shall be NEMA/EEMAC Type 1 (general purpose) 3R non-walk-in (rainproof).

D. Each 20 inch (508 mm) wide standard section shall have all the necessary hardware and bussing for modular plug-on units to be added and moved around. Unused space shall be covered by hinged blank doors or appropriate cover plate and equipped to accept future units. Vertical bus openings shall be covered by manual bus shutters.

E. Each section shall include, but shall not be limited to, a top plate (single piece or two-piece). NEMA/EEMAC Type 12 shall also include a bottom plate. Top and bottom plates shall be removable for ease in cutting conduit entry openings.

2.05 WIREWAYS

A. Structures shall contain a minimum 12 inch (305 mm) high horizontal wireway at the top of each section and a minimum 6 inch (152 mm) high horizontal wireway at the bottom of each section. These wireways shall run the full length of MCC to allow room for power and control cable to connect between units in different sections.

B. A full-depth vertical wireway shall be provided in each MCC section that shall accept modular plug-on units. The vertical wireway shall connect with both the top and bottom horizontal wireway. The vertical wireway shall be 4 inches (102 mm) wide minimum with a separate hinged door. There shall be a minimum of 60 square inches (387 square centimeters) of cabling space available for 15 inch (381 mm) deep sections and 80 square inches (516 square centimeters) of cabling space available for 20 inch (508 mm) deep sections. Access to the wireways shall not require opening control unit doors. Structures that house a single, full section control unit are not required to have vertical wireways. Those control units shall open directly into the MCC horizontal wireways.

2.06 BARRIERS

A. Power bussing and splice connections shall be isolated from the unit compartments and the wireways. The horizontal bus shall be mounted onto a glass-filled polyester support assembly that shall brace the bus against the forces generated during a short circuit. The horizontal bus shall be isolated from the top horizontal wireway by a two-piece rigid non-conductive barrier. The barrier design shall allow qualified personnel to slide the barriers both left and right, to allow access to the bus and connections for maintenance without having to remove the barrier. Barrier sliding shall occur via an upper and lower track system.

B. The vertical bus shall be housed in a molded glass-filled polyester support that shall provide bus insulation and shall brace the bus against the forces generated during a short circuit. These supports shall have openings every 3 inches (76 mm) for unit stab-on connections. Each opening shall be provided with a manual shutter to close off the stab opening. These shutters shall be attached to the structure so that when they are removed (to allow a stab connection) they shall be retained in the structure and shall be readily accessible for use should a plug-in unit be removed from the MCC.

C. Barriers shall be provided in the vertical structure and unit designs to prevent the contact of any energized bus or terminal by a fishtape inserted through the conduit or wireway areas.

2.07 BUSSING

A. Bussing and connectors shall be tin-plated copper.

B. The main horizontal bus shall be rated at 1200 amperes continuous and shall extend the full length of the MCC. Bus ratings shall be based on 149 degree F (65 degree C) maximum temperature rise in a 104 degree F (40 degree C) ambient. Provisions shall be provided for splicing additional sections onto either end of the MCC.

C. The horizontal bus splice bars shall be pre-assembled into a captive bus stack. This bus stack shall be installed into the end of the MCC power bus to allow the installation of additional sections. The main bus splice shall utilize four bolts, two on each side of the bus split, for each phase. Additional bolts shall not be required when splicing higher amperage bus. The splice bolts shall secure to self-clenching nuts installed in the bus assembly. It shall be possible to maintain any bus connection with a single tool.

D. Each section that accepts plug-in units shall be provided with a vertical bus for distributing power from the main bus to the individual plug-in starter units. This bus shall be of the same material and plating as the main bus, and shall be rated at 600 amperes continuous. The vertical bus shall be connected directly to the horizontal bus stack without the use of risers or other intervening connectors. It shall be possible to maintain the vertical to horizontal bus connection with a single tool. Nut-and-bolt bus connections to the power bus shall not be permitted. When a back-to-back unit arrangement is utilized, separate vertical bus shall be provided for both the front and rear units.

E. A tin-plated copper ground bus shall be provided that shall run the entire length of the MCC. The ground bus shall be 0.25 inch (6.35 mm) by 2 inches (51 mm) and shall be rated for 600 amperes. A compression lug shall be provided in the MCC for a 4/0-250 kcmil ground cable. The ground bus shall be provided with six 0.38 inch (9.65 mm) holes for each vertical section to accept user-supplied ground lugs for any loads requiring a ground conductor.

F. Each vertical section shall have a copper vertical ground bus that shall be connected to the horizontal ground bus. This vertical ground bus shall be installed so that the plug-in units engage the ground bus prior to engagement of the power stabs and shall disengage only after the power stabs are disconnected upon removal of the plug-in unit.

G. The system shall be rated for an available short circuit capacity of 65,000 amperes rms.

2.08 TYPICAL UNIT CONSTRUCTION

A. Units with circuit breaker disconnects through 400 ampere frame, and fusible switch disconnects through 400 amperes, shall connect to the vertical bus through a spring reinforced stab-on connector. Units with larger disconnects shall be connected directly to the main horizontal bus with appropriately sized cable or riser bus.

B. Conducting parts on the line side of the unit disconnect shall be shrouded by a suitable insulating material to prevent accidental contact with those parts.

C. Unit mounting shelves shall include, but shall not be limited to, hanger brackets to support the unit weight during installation and removal. Plug-on units shall use a twin-handle camming lever located at

the top of the bucket to rack in and out the plug-on unit. The cam lever shall work in conjunction with the hanger brackets to ensure positive stab alignment.

D. A lever handle operator shall be provided on each disconnect. With the unit stabs engaged onto the vertical phase bus and the unit door closed, the handle mechanism shall allow complete on/off control of the unit. Circuit breaker operators shall include, but shall not be limited, a separate tripped position to clearly indicate a circuit breaker trip condition. It shall be possible to reset a tripped circuit breaker without opening the control unit door. Clear indication of disconnect status shall be provided, by adhering to the following operator handle positions:

1. Handle on position shall be up or to the left and within 45 degrees of being parallel to the face of the equipment.

2. Handle off position shall be down or to the right and within 45 degrees of being parallel to the face of the equipment.

3. The minimum separation between the on and off positions shall be 90 degrees.

4. On circuit breaker disconnects, the handle tripped position shall be perpendicular to the face of the equipment ±30 degrees. Minimum separation between on and tripped shall be 30 degrees. Minimum separation between tripped and off shall be 45 degrees.

E. A mechanical interlock shall prevent the operator from opening the unit door when the disconnect is in the on position. Another mechanical interlock shall prevent the operator from placing the disconnect in the on position while the unit door is open. It shall be possible for authorized personnel to defeat these interlocks.

F. A non-defeatable interlock shall be provided to prevent installing or removing a plug-on unit unless the disconnect is in the off position.

G. The plug-in unit shall have a grounded stab-on connector which shall engage the vertical ground bus prior to, and shall release after, the power bus stab-on connectors.

H. Provisions shall be provided for locking disconnects in the off position with up to three padlocks.

I. Handle mechanisms shall be located on the left side to encourage operators to stand to the left of the unit being switched.

J. Unit construction shall combine with the vertical wireway isolation barrier to provide a fully compartmentalized design.

2.09 COMPONENTS FOR TYPICAL UNITS

A. Combination Starters:

1. Combination starters shall use a unit disconnect as described in Typical Unit Construction Article above. Magnetic starters shall be furnished in combination starter units. Starters shall utilize NEMA/EEMAC rated contactors. Starters shall be provided with a three-pole, external manual reset, overload relay for solid state thermal overload units.

2. When provided, control circuit transformers shall include, but shall not be limited to, two primary protection fuses and one secondary fuse (in the non-ground secondary conductor). The transformer shall be sized to accommodate the contactor(s) and connected control circuit loads. The transformer rating shall be fully visible from the front when the unit door is opened.

3. When a unit control circuit transformer is not provided, the disconnect shall include, but shall not be limited to, an electrical interlock for disconnection of externally powered control circuits.

4. Auxiliary control circuit interlocks shall be provided where indicated. Auxiliary interlocks shall be field convertible to normally open or normally closed operation.

5. NEMA/EEMAC Size 1-4 starters shall be mounted directly adjacent to the wireway so that power wiring (motor leads) shall connect directly to the starter terminals without the use of interposing terminals. Larger starters shall be arranged so that power wiring may exit through the bottom of the starter cubical without entering the vertical wireway.

B. Terminal Blocks:

1. When Type B wiring is specified, starter units shall be provided with unit control terminal blocks.

2. Terminal blocks shall be the pull-apart type with a minimum rating of 250 volts and 10 amperes. Current carrying parts shall be tin-plated. Terminals shall be accessible from inside the unit when the unit door is opened. Terminal blocks shall be DIN rail-mounted with the stationary portion of the block secured to the unit bottom plate. The stationary portion shall be used for factory connections, and shall remain attached to the unit when removed. The terminals used for field connections shall face forward so they can be wired without removing the unit or any of its components.

3. When Type C wiring is specified, starter units shall be provided with unit control terminal blocks as described for Type B wiring along with power terminal blocks for Size 1-3 units. An additional set of terminal blocks shall be provided in a terminal compartment located in each section. These terminal blocks shall be pre-wired to the unit terminals so that field control connections can be made at the terminal compartments.

C. Nameplates: Provide engraved phenolic nameplates for each MCC and unit compartment. Provide gray background with white letters, measuring a minimum of 1.5 inches (38 mm) high by 6.25 inches (159 mm) wide total outside dimensions.

D. Pilot Device Panel: Each combination starter unit shall be proved with a hinged/removable control station plate, which can accommodate up to five 0.87 inch (22 mm) pilot devices or three 1.18 inch (30 mm) pilot devices. The control station plate can be deleted if no local unit pilot devices are required.

2.10 SIX INCH (152 MM) UNIT CONSTRUCTION

A. Units with circuit breaker disconnects through 250 ampere frame and fusible switch disconnects through 100 amperes shall connect to the vertical bus through a spring-reinforced, stab-on connector. Stab-on plug-on units shall be cable connected to the unit disconnect. Six inch (152 mm) fusible units shall accept Class J fuses only.

B. Conducting parts on the line side of the unit disconnect shall be shrouded by a suitable insulating material.

C. Unit mounting shelves shall include, but shall not be limited to, hanger brackets to support the unit weight during installation and removal. Six inch (152 mm) plug-on units shall be installable without the assistance of a camming device so as to allow maximum accessibility with the unit installed.

D. A lever handle operator shall be provided on each disconnect. With the unit stabs engaged into the vertical phase bus and the unit door closed, the handle mechanism shall allow complete on/off control of the unit disconnect with clear indication of the disconnects status. Circuit breaker operators shall include, but shall not be limited to, a separate tripped position to clearly indicate a circuit breaker trip condition. It shall be possible to reset a tripped circuit breaker without opening the control unit door.

1. A mechanical interlock shall prevent an operator from opening the unit door when the disconnect is in the on position. Another mechanical interlock shall prevent an operator from placing the disconnect in the on position while the door is open. It shall be possible for authorized personnel

to defeat these interlocks.

2. A non-defeatable interlock shall be provided between the handle operator and the structure to prevent installing or removing a plug-on unit unless the disconnect is in the off position. The plug-on unit shall have a grounded stab-on connector which shall engage the vertical ground bus prior to, and shall release after, the power bus stab-on connectors.

E. Provisions shall be made for locking disconnects in the off position with up to three padlocks.

F. Handle mechanisms shall be located on the bottom left side of the unit and operate horizontally to encourage operators to stand to the left of the unit being switched.

G. Unit construction shall combine with the vertical wireway isolation barrier to provide a fully compartmentalized design.

H. Up to a maximum of twelve 6 inch (152 mm) units shall be able to be installed per vertical section without placement restrictions in new or existing applications.

2.11 COMPONENTS FOR 6 INCH (152 MM) UNITS

A. Six Inch (152 mm) Combination Starters

1. Six inch (152 mm) combination starters shall use a unit disconnect as described in Six Inch (152 mm) Unit Construction Article above. Starters shall use NEMA/EEMAC rated contactors. Starter units shall be provided with a 3-pole, external manual reset, overload relay for solid state (NEMA rated units only motor overload protection.

2. When provided, control circuit transformers shall include, but shall not be limited to, two primary protection fuses and one secondary fuse (in the non-ground secondary conductor). The transformer shall be sized to accommodate the contactor(s) and connected control circuit loads.

3. When a unit control circuit transformer is not provided, the disconnect shall include, but shall not be limited to, an electrical interlock for disconnection of externally powered control circuits.

4. Auxiliary control circuit interlocks shall be provided where indicated. For NEMA rated starters, auxiliary interlocks shall be field convertible to normally open or normally closed operation.

5. NEMA/EEMAC Size 1 starters shall be mounted directly adjacent to the wireway so that power wiring (motor leads) shall connect directly to the starter terminals.

B. Terminal Blocks for Six Inch (152 mm) Units:

1. Starter units shall be provided with unit control terminal blocks.

2. Terminal blocks shall be pull-apart type, 250 volts, and rated for 10 amperes. Current-carrying parts shall be tin-plated. Terminals shall be accessible from inside the unit when the unit door is opened. The stationary portion of the terminal block shall be used for factory connections and shall remain attached to the unit when the portion used for field connections is removed. The terminals used for field connections shall be accessible so they can be wired without removing the unit or any of its components.

C. Nameplates: Engraved phenolic nameplates shall be provided for each MCC and unit compartment. Each nameplate shall have a gray background, white lettering, and shall measure a minimum of 1.5 inches (38 mm) high by 6.25 inches (159 mm) wide total outside dimensions.

D. Pilot Device Control Panel: Each unit shall be provided with a control panel for up to a maximum of four pilot devices. Pilot device control panel can be deleted if no local unit pilot devices are required. Control

panel shall be removable by loosening two semi-captive fasteners for user access.

2.12 VARIABLE FREQUENCY AC DRIVE UNIT CONSTRUCTION

A. The Drive shall be solid state, with a Pulse Width Modulated (PWM) output. The Drive shall be a Sensorless Vector AC to AC converter utilizing the latest insulated gate bipolar transistor (IGBT) technology. The Drive shall employ a Sensorless Vector inner loop torque control strategy that mathematically determines motor torque and flux. The Drive must also provide an optional operational mode for V/Hz Operation.

B. Ratings

1. The Drive shall be rated to operate from 3-phase power at 208VAC to 600VAC, +10% /-15%, 48Hz to 63Hz. The Drive shall employ a full wave rectifier to prevent input line notching and operate at a fundamental (displacement) input power factor of 0.98 at all speeds and nominal load. The Drive efficiency shall be 98% or better at full speed and load. An internally mounted AC line reactor or DC choke shall be provided to reduce input current harmonic content, provide protection from power line transients such as utility power factor correction capacitor switching transients and reduce RFI emissions. When a DC choke is utilized it shall be of swinging choke design to mitigate harmonics substantially more than conventional choke designs and shall provide equivalent to 5% impedance.
2. The overvoltage trip level shall be a minimum of 30% over nominal, and the undervoltage trip level shall be a minimum 35% under the nominal voltage.
3. Output voltage and current ratings shall match the adjustable frequency operating requirements of standard 200-575VAC, 3ph, 60Hz, NEMA Design B motors. The short term normal duty overload current capacity shall be 110% of rated current for one (1) minute out of ten (10) minutes. The short term heavy duty overload current capacity shall be 150% of rated current for one (1) minute out of ten (10) minutes and peak overload capacity shall be 180% for two (2) seconds out of each minute with an instantaneous overcurrent trip at 350% or higher. Output frequency shall be adjustable between 0Hz and 500Hz. Operation above motor nameplate shall require programming changes to prevent inadvertent high-speed operation. The Drive shall be furnished in a UL Type 1 (NEMA 1) listed enclosure rated for operation at ambient temperatures between -15° and 40°C at an altitude not exceeding 3300 feet, with relative humidity less than 95% and no condensation allowed. The Drive shall be protected from atmospheric contamination by Chemical gasses and Solid particles per IEC 60721-3-3; Chemical gasses Class 3C2 and Solid particles Class 3S2. The Drive shall be protected from vibration per IEC 60721-3-3, Class 3M4 (sinusoidal displacement 3.0 mm (0.12 in.), 2Hz to 9Hz; acceleration 10 m/s^2 (33 ft/s^2), 9Hz to 200Hz).

C. Control Functions and Adjustments

1. A start-up assistant will query the user to provide Start-up data specific to operation of a submersible pump, centrifugal pump/fan and positive displacement pump or compressor. Additional entries shall include motor nameplate power, speed, voltage, frequency and current.
2. A motor parameter ID function shall automatically define the motor equivalent circuit used by the sensorless vector torque controller.
3. Two independent PID speed/torque loop regulators shall be provided with an autotune function as well as manual adjustments.
4. A dynamic braking chopper shall be provided on all models rated up to 15 horsepower 600V and up to 10 horsepower 240V.
5. A selection of seven (7) preprogrammed application macro parameter sets shall be provided to minimize the number of different parameters to be set during start-up. Macros included as standard are as follows: ABB Standard, 3-Wire, Alternate, Motor Potentiometer, Hand/Auto, PID Control, and Pump & Fan Control (PFC).. A selection of two (2) User Defined Parameter Sets shall also be available.
6. Carrier frequency shall be adjustable between 1 and 12 kHz up to 200 HP 480V or 150 HP 600V and between 1 and 4 kHz from 250 through 550 HP 480V. The VFD shall automatically adjust

the carrier frequency dependent upon Drive temperature and load. Increased temperatures result in automatically decreased switching frequency to ensure continuous operation of the Drive.

7. Start/Stop control functions shall include two (2) or three-(3) wire start/stop, coast/ramp stop selections, optional dynamic braking and flux braking.
8. The VFD shall be capable of starting into a rotating load (forward or reverse) and accelerate or decelerate to reference without safety tripping or component damage (flying start). The VFD shall also be capable of flux braking at start to stop a reverse spinning motor prior to ramp.
9. The VFD shall have the ability to automatically restart after an overcurrent, overvoltage, undervoltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between reset attempts shall be programmable.
10. Accel/Decel control functions shall include two (2) sets of ramp time adjustments with linear and two (2) s-curve ramp selections.
11. Speed/Torque control functions shall include:
    a. Variable min./max. speed and/or torque limits
    b. Selection of up to seven (7) preset speed settings or external speed control
    c. Two (2) independent built-in PID controllers to control a process variable such as pressure, flow or fluid level.
    d. Two (2) analog inputs shall be programmable to form a reference by addition, subtraction, multiplication, minimum selection or maximum selection.
12. Output control functions shall include:
    a. Current and torque limit adjustments to limit the maximum Drive output current and the maximum torque produced by the motor. These limits shall govern the inner loop torque regulator to provide tight conformance with the limits with minimum overshoot.
    b. A torque regulated operating mode with adjustable torque ramp up/down and speed/torque limits.
13. The VFD shall be capable of sensing a loss of load (broken belt / broken coupling) and signal the loss of load condition. The Drive shall have user adjustable load curves (motor torque as a function of frequency) defined by five (5) points to signal this condition via a keypad warning, relay output and/or over the serial communications bus. Relay output shall include programmable time delays that will allow for Drive acceleration from zero speed without signaling a false underload condition.
14. The Drive shall have programmable "Sleep" and "Wake up" functions to allow the Drive to be started and stopped from the level of a process feedback signal.
15. Three (3) programmable critical frequency lockout ranges to prevent the VFD from operating the load continuously at an unstable speed.

D. Static and Dynamic Performance
    1. Open loop static speed regulation shall be 0.5 % to 1% of rated motor speed. Dynamic speed accuracy shall be less than 1%-sec with 100% torque step open loop and 0.5%-sec closed loop with 100% torque step.

E. Operator Control Panel (Keypad)
    1. Each VFD shall be equipped with a front mounted operator control panel (keypad) consisting of a backlit, alphanumeric, graphic display and a keypad with keys for Hand, Off and Auto, Up/Down and Help. Two (2) Softkeys will be provided which change functionality depending upon the position within the parameter hierarchy or state of panel.
    2. All parameter names, fault messages, warnings and other information shall be displayed in complete English words or Standard English abbreviations to allow the user to understand what is being displayed without the use of a manual or cross-reference table.
    3. Other languages selectable in addition to English shall be as follows: French, Spanish, Portuguese, German, Italian, Dutch, Danish, Swedish, Finnish, Czech, Polish, Russian, Hungarian and Turkish.
    4. The Display shall have contrast adjustment provisions to optimize viewing at any angle.

5. The control panel shall provide a real time clock for time stamping events and fault conditions.
6. The control panel shall include a feature for uploading parameter settings to control panel memory and downloading from the control panel to the same Drive or to another Drive.
7. All Drives throughout the entire power range shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating.
8. The keypad is to be used for Hand control, for setting all parameters, and for stepping through the displays and menus.
9. The keypad shall be removable and insertable under Drive power, capable of remote mounting, and shall have its own non-volatile memory.
10. The standard operator panel shall provide a start-up, maintenance and diagnostic assistants that guide a new user through initial start-up and commissioning of the Drive as well as provide indications for maintenance and help to diagnose a fault. In addition, a PID assistant, Real-time Clock assistant, Serial Communications assistant, and Drive Optimizer assistant shall be included. A Drive Optimizer assistant permits the user to choose Drive set-up for low nose, drive & motor efficiency or motor control accuracy.
11. User input of Pump Power and Energy Price will provide means of real time display of saved KWH, Saved Amount (energy savings resulting from VFD) and Saved CO_2.
12. A Load Analyzer function will provide profiling users load and process with three different variables within 10% bands showing time within bands from 0 to 100%.
13. During normal operation, one (1) line of the control panel shall display the speed reference, and run/stop forward/reverse status. The remaining three (3) lines of the display shall be programmable to display the values of any three (3) operating parameters. At least twenty-six (26) selections shall be available including the following:
    a. Speed/torque in percent (%), RPM or user-scaled units
    b. Output frequency, voltage, current and torque
    c. Output voltage, power and kilowatt hours
    d. Heatsink temperature and DC bus voltage
    e. Status of discrete inputs and outputs
    f. Values of analog input and output signals
    g. Values of PID controller reference, feedback and error signals.
    h. Control interface inputs and outputs shall include:

F. I/O Capabilities
1. Six (6) digital inputs 12 to 24VDC PNP and NPN, all independently programmable with at least twenty-five (25) input function selections. Inputs shall be designed for "dry contact" inputs used with either an internal or external 24 VDC source.
2. Three (3) form C relay contact digital outputs, all independently programmable with at least thirty (30) output function selections. Relay contacts shall be rated to switch a maximum two (2) Amps rms continuous current at a maximum switching voltage of 30VDC or 250VAC. Function selections shall include indications that the Drive is ready, running, reversed and at set speed/torque. General and specific warning and fault indications shall be available. Adjustable supervision limit indications shall be available to indicate programmed values of operating speed, speed reference, current, torque and PID feedback. An optional relay expansion card shall be available to provide three (3) additional relay outputs. This option card shall be integrally mounted.
3. Two (2) analog inputs, each selectable for 0VAC - 10VAC or 4mA - 20mA, and independently programmable with at least ten (10) input function selections. Analog input signal processing functions shall include scaling adjustments, adjustable filtering and signal inversion. If the input reference (4-20mA or 0-10V) is lost, the VFD shall give the user the option of the following: (1) stopping and displaying a fault, (2) running at a programmable preset speed, (3) hold the VFD speed based on the last good reference received, or (4) cause a warning to be issued, as

selected by the user. The Drive shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communications bus.

4. Two (2) analog outputs providing 0 (4) to 20mA signals. Outputs shall be independently programmable to provide signals proportional to at least twelve (12) output function selections including output speed, frequency, voltage, current and power.

G. Serial communications

1. Serial communication interface modules are available for a wide selection of communication protocols. Available adapters are as follows: EtherNet/IP, DeviceNet, Profibus DP, CANopen, ControlNet and PROFINET IO. Communications modules shall be internally mountable. I/O shall be accessible through the serial communications adapter.
2. The VFD shall have an RS-485 port as standard. The standard embedded protocol shall be Modbus RTU.
3. Serial communication capabilities shall include, but not be limited to, run-stop control; speed set adjustment, proportional/integral/derivative PID control adjustments, current limit, and accel/decel time adjustments. The Drive shall have the capability of monitoring feedback such as process variable feedback, output speed/frequency, current (in amps), % torque, power (kW), kilowatt hours (resettable), operating hours (resettable), relay outputs, and diagnostic warning and fault information. Additionally, remote Local Area Network (LAN) VFD fault reset shall be possible. A minimum of fifteen (15) field parameters shall be capable of being monitored. The DDC system shall be able to monitor if the motor is running in the VFD mode or bypass mode (if bypass is specified) over serial communications.
4. The VFD shall allow the DDC to control the Drive's digital and analog outputs via the serial interface. The serial communications interface shall allow for Digital Ouput DO (relay) control and Analog Output (AO) control. This control shall be independent of any VFD function. Examples of possible DO usage are as follows: Opening check valves, opening discharge valves, starting auxiliary equipment, etc. In addition, status of DO's is available over the communications link. Examples of possible AO usage are as follows: Controlling a bypass valve position, throttling valve position, etc. In addition, status of AO's is available over the communications link.

H. The operator panel port shall be connectable to a personal computer interface. Microsoft© Windows based software shall be available for Drive setup, diagnostic analysis, maintenance, monitoring and control. The software shall follow trends and provide real time graphical displays of Drive performance.

I. Protective Functions

1. For each programmed warning and fault protection function, the Drive shall display a message in complete English words or Standard English abbreviations. The three (3) most recent fault messages along with time, current, speed, voltage, frequency and DI Status shall be stored in the Drive's fault history. The last ten (10) fault names shall be stored in Drive memory.
2. The Drive shall include internal MOV's for phase to phase and phase to ground line voltage transient protection.
3. Output short circuit withstand rating and ground fault protection rated for 100,000 AIC shall be provided per UL508C without relying on line fuses. Motor phase loss protection shall be provided.
4. The Drive shall provide electronic motor overload protection qualified per UL508C.
5. Protection shall be provided for AC line or DC bus overvoltage at 130% of max. rated or undervoltage at 65% of min. rated and input phase loss.
6. A power loss ride through feature will allow the Drive to remain fully operational after losing power as long as kinetic energy can be recovered from the rotating mass of the motor and load.
7. Stall protection shall be programmable to provide a warning or stop the Drive after the motor has operated above a programmed torque level for a programmed time limit.
8. Underload protection shall be programmable to provide a warning or stop the Drive after the motor has operated below a selected underload curve for a programmed time limit.

9. Over-temperature protection shall provide a warning if the power module temperature is less than 5°C below the over-temperature trip level.

10. Input terminals shall be provided for connecting a motor thermister (PTC type) to the Drive's protective monitoring circuitry. An input shall also be programmable to monitor an external relay or switch contact (klixon).

J. The following shall be provided where bypass is required:

1. A complete factory wired and tested bypass system consisting of output and bypass contactors, a motor overload relay, a control power transformer with primary and secondary fusing, a cover mounted DRIVE-OFF-BYPASS selector switch, a service (isolation) switch and fast acting, current limiting VFD input fuses are required. Bypass designs, which have no VFD only fuses, or that incorporate fuses common to both the VFD and the bypass will not be accepted

2. An input circuit breaker with a door mounted external operating handle, interlocked with the enclosure door and lockable in the OFF position with up to three padlocks, to disconnect all input power from the drive and all internally mounted options.

3. Motor overload protection for the bypass mode is to be provided by a motor overload relay connected in both the drive and bypass modes of operation. The motor overload relay shall be an adjustable trip, bimetallic overload relay with a class 20 trip characteristic.

4. The drive output contactor and the bypass contactor are to be electrically interlocked to prevent simultaneous operation.

5. The bypass system shall NOT depend on the VFD for bypass operation. The bypass shall be completely functional even if the VFD has been removed from the enclosure for repair / replacement

2.13 SOLID STATE REDUCED VOLTAGE STARTER UNIT CONSTRUCTION

A. MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Baldor Electric Company

B. SOFTSTARTER

1. Description: (6) SCR three phase full wave, UL508C listed and labeled as a complete unit and arranged to provide controlled starting of a NEMA MG 1, AC squirrel cage induction motors.

2. Design and Rating: Match load type such as extruders, conveyors, fans, blowers, and pumps; and type of connection used between motor and load such as direct or through a power-transmission connection.

3. Output Rating: 3-phase; 30 starts/Hr. (30-300A) or 10 starts/Hr. (370-1050A), minimum.

4. Unit Operating Requirements:
   a. 3 phase input AC voltage tolerance as follows:
      208 to 575 V, -15% to +10%.
   b. Input frequency tolerance of 50/60 Hz, ±5%.
   c. Capable of driving full load, under the following conditions, without derating:
      1. Ambient Temperature: -60°C to 40°C. (-76°F-104°F.)
      2. Humidity: Less than 95 percent (non-condensing).
      3. Altitude: 3300 feet (1000 m).
   d. Minimum Efficiency: 96 percent at 60 Hz, full load.

e. Starting Capacity:
   1. Normal Duty: 400% of motor current for 30 seconds and Class 10 motor running p protection.
   2. Heavy Duty: 350-400% for 60 seconds and Class 30 motor running protection.

5. Internal Adjustability Capabilities:
   a. Acceleration Control: As a minimum, the Softstarter shall come complete with the following settings:
      1. Initial Voltage: Initial voltage output shall be adjustable between 30-70% of the nominal voltage.
      2. Maximum Current Limit: Current Limit shall be adjustable between 200% and 500% of the Soft starter's rated full load current.
      3. Ramp Time: The time between initial torque and full output torque shall be adjustable between 1 and 120 seconds in increments of one second.
      4. Kick Start: To accommodate high inertia loads, the Softstarter shall include settings for a kick start. The kick start initial voltage setting shall be adjustable between 50-100% of nominal voltage. The kick start time shall be adjustable between 0.1 and 1.5 seconds in increments of 0.1 seconds.
      5. Jog: To allow rotation checks during start-up or perform test procedures, the Softstarter shall include a jog function that matches the programmed acceleration profile. The jog function shall be initialized either directly from the keypad or through a programmable input.
   b. Preset Application Macros
      The Softstarter shall be provided with preset application macros. The macros shall be fully adjustable to allow optimization of starting and stopping parameters. The Softstarter must contain macros for the most common applications as follows:
      Hydraulic Pump
      Centrifugal Pump
      Compressor
      Conveyor Belt
      Centrifugal Fan
      Axial Fan
      Crusher
      Mixer
      Bow Thruster
   c. Sequence Start: The Softstarter shall have the ability to sequentially start up to three motors. Each sequential start shall include independently programmable start ramp profiles. Each start ramp profile shall include programmable settings for initial voltage, ramp time, and maximum current limit.
   d. Deceleration Control (softstop) shall be a standard feature. All deceleration setting shall be independent of any acceleration setting. As a minimum, the Softstarter shall come complete with the following settings:
      1. Step Down Voltage: To eliminate hunting effects for pump applications, a step down voltage shall be available and adjustable from 30 to 100% of the line voltage
      2. Ramp Time: The deceleration time should be adjustable from 0-120 seconds in increments of one second to allow controlled deceleration (soft stop) of motors.
      3. End Voltage Level: The end voltage level shall be adjustable from 30-70% of line voltage.
   e. Motor and Load Protection
      Motor and Load Protection shall be integrated with the Softstarter. All protection functions shall under no circumstances be disconnected or disabled when a by-pass contactor is used. To protect both the motor and load, the Softstarter shall be provided with the following functions as a minimum:
      1. Motor Overload Protection: Motor overload protection shall be programmable from Class 10A, 10, 20 and 30. The overload protection shall be based on a Dynamic Thermal Register retained in memory even upon loss of power.
      2. Dual Overload Protection: The Softstarter must include two separate overload curves; one for starting and one for continuous run. Dual overload protection will allow

a higher trip class to avoid nuisance tripping during acceleration while providing maximum motor protection during continuous run conditions. For maximum flexibility, each trip curve shall be independently programmable within the four different trip curve class described previously.

3. Manual or Automatic Reset: For maximum flexibility, the Softstarter shall be programmable to allow automatic reset for unattended remote applications. The factory default shall be manual reset.
4. Thermal Memory: The over load protection shall not lose track of the motor temperature after loss of power. Upon reapplication of power, the microprocessor shall update the motor temperature and adjust for real time cooling while the power was off.
5. PTC Protection: Input terminals for PTC signals directly from the motor to the Softstarter shall be available as a standard design feature.
6. Thermal Capacity Reset Level: The Softstarter shall not allow a restart of the motor after an over load trip if sufficient thermal capacity is not available for a success re-start.
7. Phase Imbalance Protection: The Softstarter shall be provided with programmable phase imbalance protection. The sensitivity shall be adjustable for imbalances between any two phases between 10% and 80% of the rated current.
8. Phase Reversal Protection: Protection for phase reversal shall be available to prevent the Softstarter from starting if the phases are connected in a different order than ABC. This will ensure that the motor will not turn in an inappropriate direction.
9. High Current Protection: The Softstarter shall be equipped with high current protection and shall trip if the current exceeds eight times the set rated current.
10. Locked Rotor Protection (electronic shear pin protection): Locked rotor protection shall be available. The trip current shall be programmable from 300% to 800% of set rated current. The time delay before tripping shall be adjustable from 0.2 to 10 seconds.
11. Under Load Protection: The Softstarter shall be equipped with under load protection and shall trip if the current decreases below a preset level during a certain time period. The trip level shall be programmable from 40% to 100% of the programmed full load motor current. The time delay before tripping shall be adjustable from 1 to 30 seconds.

f. Softstarter Protection

Softstarter protection shall be provided to maintain reliability for both the driven equipment and the electrical components. Softstarter Overload Protection shall be built-in and protect the SCR'S from exceeding their maximum load capacity.

g. Fault Detection

To protect the motor and load, the Softstarter shall be provided with fault detections. All fault detections and signals shall be standard and shall not be possible to disable. When a fault occurs, the type of fault shall be clearly indicated on the LCD screen. As a minimum, the following fault indications shall be available:

1. Softstarter Over Temperature Fault: Softstarter over temperature protection shall be built-in and protect the SCR's from excessive heat in the enclosure and/or heat sink. The temperature shall be measured directly on the Soft starter's heat sink with an internal temperature sensor.
2. Phase-Loss Detection: Phase loss detection shall be standard and shut down the Softstarter if the voltage in any phase is not detected on the line side of the Softstarter.
3. Shorted SCR Detection: Shorted SCR detection shall automatically prevent a start sequence when at least one SCR is shorted.
4. Non-conducting SCR Detection: The Softstarter shall prevent a start when at least one SCR is not conducting.
5. Frequency Out of Range Detection: The Softstarter shall automatically shut down if the line frequency is outside the standard range specified under Power Ratings.
6. Main Voltage on Line Side Detection: The Softstarter shall indicate if there is no line voltage connected when in standby mode.
7. Open Circuit on Motor Side: The Softstarter shall indicate open circuit on motor side and shall stop the motor if the circuit is open on the motor side (i.e., no motor is connected).

8. Bypass Monitoring: If an external by-pass contactor is used, and for any reason the by- pass contactor does not close when given the closing signal, the Softstarter shall indicate a fault and stop.

h. Warning Indications

To prevent nuisance tripping, warning signals shall be available. This feature makes it possible to detect and correct a fault before tripping. The following warning signals shall be provided as a minimum:

1. Motor Overload Warning: It shall be possible to set a temperature level between 40 and 99% of the maximum theoretical motor temperature at which a warning signal will be activated.
2. Softstarter Overload Warning: It shall be possible receive a warning signal when theoretical temperature of the SCR's exceeds 90% of its rated maximum capacity.
3. High Current Warning: It shall be possible to receive a warning signal when the current reaches a settable level between 0.5 and 5 times the full load current for 200ms.
4. Low Current Warning: It shall be possible to set an under current level between 40 and 100% of the full load current at which point the Softstarter will create a low current warning.

i. Inputs

Two programmable input signals shall be available. Each input shall be programmable for the following: None, Remote Reset, Jog, Enable, Start of second motor, and Start of third motor.

All input and control devices shall be rated for 24VDC control.

Start and Stop shall be possible using either the Soft starter's internal control voltage supply, or use an external 24VDC source. Using an external 24VDC source for the control voltage makes it possible to operate the Softstarter directly from a PLC without the need of an external relay.

j. Outputs

The Softstarter unit shall have a minimum of three physical signal relays and one virtual relay when communication is used. Each relay shall have one normally open (NO) and one normally closed (NC) potential free contact. Each relay shall be individually programmable for any one of the three functions listed below. All options included in the "Event" list shall be enabled or disabled individually.

1. Run
2. Top of Ramp
3. Event list options shall include the following:
   - Motor overload protection
   - High current protection
   - SCR overload protection
   - Locked rotor protection
   - Underload protection
   - Phase reversal protection
   - Phase imbalance protection
   - PTC protection
   - Fault
   - By-pass monitoring
   - Overload warning
   - SCR overload warning
   - High current warning
   - Low current warning

6. Operator Interface

The Softstarter shall be provided with an energy saving LCD display with the following design specifications:

a. LCD Display: A 2-line 20 character per line LCD display shall be provided. The use of binary, hexadecimal or any other code is not acceptable.

b. Energy Saver: A programmable LCD energy saving function shall be provided. The energy saver shall allow the LCD to turn off after a pre-programmed amount of time. The energy saver function can be disabled if desired.

c. Adjustments: All adjustments shall be made by a four-button keypad. No binary coded dipswitches shall be used for programming or function selection.

d. Password Protection: Password protection shall be available to prevent unauthorized changes to the programming.

e. Data: All data presented shall be possible to interpret without the use of index tables and manuals. Data should always be presented with a description, the actual value, and the unit of the data (i.e. V, A or %).

f. A function shall be available for listing all the changed settings and data in the Softstarter. The listing of all the changed setting is an essential tool to trouble-shoot and service the Softstarter.

g. Data entered and selections made to the Softstarter using the display and keypad shall be stored prior to power loss and shall be retrievable after a power loss.

h. LED Indicators: Long life LED's shall provide annunciation of Power On for indicating that supply voltage is provided, Fault trip, and Protection trip. For a full description of Fault and Protections, see Outputs.

7. Metering

Metering functions shall be provided as follows:

a. Output Current: The output current of each phase shall be indicated in the range of 0 to 9999 amps.

b. Output Voltage: The output voltage shall be displayed in terms of % of rated full voltage. The indicating range shall be 0 to 100%.

c. Total Number of Start Sequences of the Softstarter: A run counter shall be provided. This counter shall not be possible to reset.

d. Total Run Time: An electronic elapsed time meter shall be provided. The elapsed time meter shall not be possible to reset.

e. Motor Temperature: At any given time, it shall be possible to check the temperature of the motor from the Softstarter. The temperature shall be given as a percentage of the maximum allowed motor temperature at which the motor over load protection will trip when enabled.

f. Real time clock: A real time clock shall be available to determine when different events have occurred.

g. Fault History

Fault message and Fault History shall be displayed automatically upon any new fault and retained in non-volatile memory for viewing by service personnel when necessary. The number of faults stored should be at least the last 20 events. Each stored fault shall provide the exact events. Each stored fault shall provide the fault condition and time the fault occurred.

8. Design Specifications

The Softstarter shall be controlled completely through solid state design algorithms. The Softstarter shall be control the current in all three phases, using two anti-parallel SCR's in each phase. The Softstarter shall be designed to the following specifications:

a. Power Ratings

1. Input: 208 to 575V -15% to +10%, 3 phase 50/60Hz ± 5%.
2. Output: Reduced voltage, three-phase AC derived from phase-angle fired inverse parallel SCR's, ramped to full voltage.
3. Output Capacity: The starting capacity shall allow the use of a Class 30 over load relay up to 500% of the rated current.
4. Control Power: Wide voltage range, 100-250VAC -15% to +10% at 50/60Hz ± 5% shall be standard on each Softstarter.

b. SCR Devices

1. PIV Ratings: 230-600V: 1400V Minimum
2. Protection: RC snubber network circuits shall be provided on each phase assembly.
3. Ambient Conditions

The Softstarter shall be capable of withstanding the following environmental conditions during operation. Electrical/ mechanical damage or degradation of performance shall not occur under these conditions.

a. Temperature: As a standard Softstarter design quality, UL documentation shall be available to show that open chassis designs have been tested for 0 – 60°C operation with de-rating above 40°C. Enclosed ventilated units shall be designed for 0 to 40°C.
b. Altitude: 1000m (3300 feet) maximum without derating.
c. Humidity: 0 to 95% RH, non-condensing.
d. Thermal: The Softstarter shall be equipped with a heat sink temperature switch designed to protect the SCR's from over temperature.
e. Storage: The Softstarter shall be stored within a temperature range of –25°C to +70°C.

c. Mechanical Construction

The Softstarter shall be constructed to the following mechanical specifications:

1. Housing and Termination: The Softstarter shall be housed in plastic or metal material and termination points provided to accommodate the required incoming cables for the line and load connections.
2. Ventilation: The Softstarter shall be ventilated with fan cooling when necessary. The fans shall be temperature regulated and automatically switch on only when cooling is necessary to reduce energy consumption and noise level.
3. Integrated Bypass Contactors: Softstarters with a rating over 300A shall be equipped with an integrated bypass contactor as standard. The integrated bypass contactor shall reduce the power loss during continuous run to less than 200W per Softstarter, independent of the size. A means to allow the integrated bypass contactor to be externally energized shall be provided to allow emergency bypass operation in the unlikely event that the Softstarter should fail. Consult factory for proper Softstarter selection when emergency bypass operation is required.
4. Bypass Connection Terminals: For Softstarter not equipped with an integrated bypass contactor, the Softstarter shall be equipped with double connections on the incoming side. The extra terminals shall be used for the bypass connections allowing the protection functionality integrated in the Softstarter to be used when the Softstarter is in bypass mode.

C. FACTORY FINISHES

Finish: Manufacturer's standard finish paint applied to factory assembled Softstarter before shipping.

2.14 DISTRIBUTED I/O SYSTEM

A. The MCC shall communicate I/O to the MTU PLC via distributed I/O as specified in 13930.

2.15 GENERAL COMMUNICATION CABLING

A. The MCC shall employ a pre-engineered communication cabling system to interconnect units within the MCC.

B. Network cabling shall be routed through the lower horizontal wireway to isolate the network from the horizontal bussing routed through the top.

C. The full-depth vertical wireway shall serve to separate communications from power cabling to prevent noise interference on the network cable.

D. The communication cabling installation shall meet Class 2 wiring practices under the provisions of NEC Articles 725 and 800.

E. Provisions for appropriate terminators and grounding shall be provided.

F. Addition, removal, or rearrangement of units shall not interrupt the trunk line and shall not affect the cabling of other units attached to the trunk line.

G. Cable assemblies shall use 5-pole micro-style connectors with a single keyway and shall comply with SAE H1738-2 specifications.

H. Connectors shall be epoxy-coated for a 500-hour salt-spray test per MIL-STD-202.

I. Cable coupler design shall include, but shall not be limited to, a vibration-resistant ratchet to prevent loosening.

J. The system shall be constructed of molded PVC material.

2.16 MODBUS COMMUNICATION CABLING

A. The Modbus cabling system shall be UL 498 listed.

B. An extended ground pin shall ensure first make/last break ground connections.

C. The cabling system shall consist of individual trunk line segments in each MCC section. A trunk/drop topology shall be used. Trunk line segments shall be routed from the lower wireway into each vertical section. The trunkline for sections containing plug-on vertical bus shall have six taps spaced 12 inches (305 mm) apart. Unused tee connectors shall be capped at the factory.

D. A 36 inch (915 mm) pigtail cable shall connect the communication device in each MCC unit to the trunk cable via a pre-engineered tap. One end of the pigtail cable shall terminate in a micro-style connector and shall be attached to the trunk. The other end shall terminate at the communication device in the MCC unit.

2.17 ETHERNET (MODBUS TCP) COMMUNICATION CABLING

A. The Ethernet (Modbus TCP) communications network shall be configured in a star topology.

B. The cabling system shall consist of multiple, custom length Ethernet patch cables that each connect a single network device to a central Ethernet switch unit located in the MCC.

C. Ethernet switches located in the MCC shall be Connexium, Hirschmann, or approved equal.

2.18 DEVICENET COMMUNICATION CABLING

A. The DeviceNet cabling system shall be ODVA rated with a trunkline-dropline topology.

B. Control power shall be provided through individual unit transformers that shall be separate from the network to reduce network power demand. This shall allow devices to operate independently of the network power supply.

C. Sectioned cabinets shall have six pre-molded trunklines with tees. Full length cabinets shall have one trunkline with a tee. A tee at the bottom of each section shall provide the means of connection to the next section with a pre-molded section of cable.

D. A 36 inch (915 mm) pigtail cable shall connect the tee in the dropline to the DeviceNet device located in the MCC unit.

2.19 CANOPEN COMMUNICATION CABLING

A. The CANopen cabling system shall be configured in a trunkline-dropline topology.

B. Control power shall be provided through individual unit transformers that shall be separate from the network to reduce network power demand. This shall allow devices to operate independently of the network power supply.

C. Sectioned cabinets shall have six pre-molded trunklines with tees. Full length cabinets shall have one trunkline with a tee. A tee at the bottom of each section shall provide the means of connection to the next section with a pre-molded section of cable.

D. A 36 inch (915 mm) pigtail cable shall connect the tee in the dropline to the CANopen device located in the MCC unit.

2.20 PROFIBUS DP COMMUNICATION CABLING

A. The PROFIBUS DP cabling system shall consist of individual trunk line segments in each MCC section. A trunkline-dropline topology shall be used. Trunk line segments shall be routed from the lower wireway into each vertical section. The trunkline for sections containing plug-on vertical bus shall have six taps spaced 12 inches (305 mm) apart. Unused tee connectors shall be capped at the factory.

B. Sectioned cabinets shall have six pre-molded trunklines with tees. Full length cabinets shall have one trunkline with a tee. A tee at the bottom of each section shall provide the means of connection to the next section with a pre-molded section of cable.

C. A 36 inch (915 mm) pigtail cable shall connect the tee in the dropline to the PROFIBUS DP device located in the MCC unit.

2.21 QUALITY CONTROL

A. The entire MCC shall go through a quality inspection before shipment. This inspection shall include, but shall not be limited to, the following:

1. Physical Inspection of the following:
    a. Structure.
    b. Electrical conductors, including, but not limited to, the following::
        1) Bussing.
        2) General wiring.
        3) Units.
2. Electrical Tests:
    a. General electrical tests shall include, but shall not be limited to, the following:
        1) Power circuit phasing.
        2) Control circuit wiring.
        3) Instrument transformers.
        4) Meters.
        5) Ground fault system.
        6) Device electrical operation.
    b. AC dielectric tests shall be performed on the power circuit.

3. Markings/labels include, but shall not be limited to, the following:

   a. Instructional type.

   b. UL/CSA.

   c. Inspector's stamps.

4. Each device shall be configured and addressed to correspond with software settings.

5. A read/write test shall be performed prior to shipment on network devices, including, but not limited to, overloads, drives, and soft starters.

6. Testing shall be designed to verify system operation and shall include, but shall not be limited to, these verifications as a minimum:

   a. Drawings and bill of materials.

   b. I/O addressing.

   c. Correct device operation by I/O address.

   d. Host communications.

   e. Control network interface.

7. The manufacturer shall use integral quality control checks throughout the manufacturing process to ensure that the MCC meets operating specifications.

3.00 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

1. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.02 INSTALLATION

A. Install low voltage industrial MCCs in accordance with reviewed product data, final shop drawings, manufacturer's written instructions and recommendations, and as indicated on the Drawings.

B. MCCs shall not be placed in hazardous locations. The area chosen shall be well ventilated and totally free from humidity, dust, and dirt. The temperature of the area shall be no less than 32 degrees F (0 degrees C) and no greater than 104 degrees F (40 degrees C). For indoor locations, protection shall be provided to prevent moisture entering the enclosure.

C. MCCs shall be located in an area with a minimum of 3 feet (914 mm) of free space in front of front-of-board construction. An additional 3 feet (914 mm) shall be allowed in the rear of back-to-back construction. This free space shall give adequate room to remove and install units. A minimum of 0.5 inch (13 mm) space shall be provided between the back of front-of-board MCCs and a wall, 6 inches (152 mm) required for damp locations).

D. The MCCs shall be assembled in the factory on a smooth level surface so that sections are properly aligned. A similar smooth and level surface shall be provided for installation. An uneven foundation will cause misalignment of shipping blocks, units, and doors. The surface under a MCC shall be of a non-combustible material unless bottom plates are installed in each vertical section.

3.03 DEMONSTRATION

A. Provide the services of a factory-authorized service representative of the manufacturer to provide start-up service and to demonstrate and train the Owner's personnel.

1. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

2. Train the Owner's maintenance personnel on procedures and schedules related to start-up and shutdown, troubleshooting, servicing, and preventive maintenance.

3. Review data in operation and maintenance manuals with the Owner's personnel.

4. Schedule training with the Owner, through the Architect, with at least seven day's advanced notice.

3.04 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to the Installer that shall ensure that the low voltage industrial MCCs shall be without damage at time of Substantial Completion.

END OF SECTION

SECTION 13476- SURGE PROTECTION FOR LOW VOLTAGE ELECTRICAL POWER CIRCUITS

1.00 GENERAL

1.01 SUMMARY

A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for surge protection for low voltage electrical power circuits as required for the complete performance of the work, and as shown on the Drawings and as herein specified.

B. Section Includes: The work specified in this Section includes, but shall not be limited to, the following:

1. Requirements for both field-mounted SPDs (externally mounted), and integrated SPDs (installed from the factory) for low voltage power distribution and control equipment.

1.02 REFERENCES

A. General: The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.

B. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

1. ANSI/IEEE C62.41.1, "Guide on the Surges Environment in Low Voltage (1000 V and Less) AC Power Circuits."

2. ANSI/IEEE C62.41.2, "Recommended Practice on Characterization of Surges in Low Voltage (1000 V and Less) AC Power Circuits."

3. ANSI/IEEE C62.45, "Guide on Surge Testing for Equipment Connected to Low Voltage AC Power Circuits."

C. International Organization for Standardization (ISO):

1. ISO 9001, "Quality Management Systems - Requirements."

D. National Fire Protection Association (NFPA):

1. NFPA 70, "National Electrical Code," hereinafter referred to as NEC.

E. Underwriters Laboratories, Inc. (UL):

1. UL 67, "Standard for Panelboards."

2. UL 96A, "Standard for Installation Requirements for Lightning Protection Systems."

3. UL 845, "Motor Control Centers."

4. UL 857, "Busways."

5. UL 891, "Switchboards."

6. UL 1283, "Standard for Safety for Electromagnetic Interference Filters."

7. UL 1449, "Standard for Surge Protective Devices."

8. UL 1558, "Standard for Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear."

1.03 DEFINITIONS

A. $I_{(n)}$: Nominal discharge current rating.

B. MCOV: Maximum continuous operating voltage.

C. Protection Modes: The pair of electrical connections where the VPR applies.

D. MOV: Metal oxide varistor; an electronic component with a significant non-ohmic current voltage characteristic.

E. OCPD: Overcurrent protective device.

F. SCCR: Short circuit current rating.

G. SPD: Surge protective device.

H. VPR: Voltage protection rating.

1.04 SYSTEM DESCRIPTION

A. General SPD Requirements:

1. SPD with accessories shall be listed and labeled as defined in NEC, by UL, and marked for intended location and application.

2. Comply with UL 1449.

3. Comply with UL 1283 (applies to Type 2 SPDs).

4. Design in accordance with ANSI/IEEE C62.41.1, ANSI/IEEE C62.41.2, and ANSI/IEEE C62.45.

5. SPDs manufacturer shall be ISO 9001 certified.

6. MCOV of the SPD shall not be less than 115 percent for 480Y/277V and 125 percent for 208Y/120V nominal RMS system voltages.

7. SPDs installed internal to the distribution equipment shall be of the same manufacturer as the equipment. The equipment shall be fully tested and certified to the following UL standards:

   a. Panelboards: UL 67.

   b. Motor Control Centers: UL 845.

   c. Busway: UL 857.

   d. Switchboards: UL 891.

   e. Switchgear: UL 1558.

1.05 SUBMITTALS

A. General: See [Section 01 33 00 - Submittal Procedures] [Section 01300 - Submittals].

B. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications.

1. For each type of product indicated include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

2. Provide verification the SPD is listed or recognized through UL to the latest safety standard, UL 1449.

C. Shop Drawings: Submit shop drawings for each product and accessory required. Include information not fully detailed in manufacturer's standard product data.

D. Operation and Maintenance Data: Submit operation and maintenance data for surge protection for low voltage electrical power circuits to include in operation and maintenance manuals.

E. Warranty Data: Submit sample of special warranties.

1.06 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Manufacturer shall be a firm engaged in the manufacture of surge protection for low voltage electrical power circuits of types and sizes required, and whose products have been in satisfactory use in similar service for a minimum of five years.

2. Installer Qualifications: Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing surge protection for low voltage electrical power circuits similar in type and scope to that required for this Project and shall be approved by the manufacturer.

B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

C. Single Source Responsibility: Obtain surge protection for low voltage electrical power circuits and required accessories from a single source with resources to produce products of consistent quality in appearance and physical properties without delaying the work. Any materials which are not produced by the manufacturer shall be acceptable to and approved by the manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project site in supplier's or manufacturer's original wrappings and containers, labeled with supplier's or manufacturer's name, material or product brand name, and lot number, if any.

B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.08 WARRANTY

A. Special Warranty: Submit a written warranty executed by the manufacturer, the Installer, and the Contractor, agreeing to repair or replace surge protection for low voltage electrical power circuits that fail in materials or workmanship within the specified warranty period.

1. Warranty Period: Warranty period shall be 10 years from date of Substantial Completion.

2.00 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Product specified is "Surgelogic Surge Protection" as manufactured by Square D by Schneider Electric. Items specified are to establish a standard of quality for design, function, materials, and appearance. Equivalent products by other manufacturers are acceptable. The Architect/Engineer will be the sole judge of the basis of what is equivalent.

2.02 SERVICE ENTRANCE SUPPRESSORS

A. SPDs: Comply with UL 1449.

1. SPDs installed on the line side of the service entrance OCPD shall be Type 1 SPDs. SPDs installed on the load side of the service entrance OCPD shall be either Type 1 or Type 2 SPDs.

2. Type 2 SPDs shall also comply with UL 1283.

B. Features and Accessories: SPDs shall provide the following features and accessories:

1. Internal fusing design capable of disconnecting the SPD before any damaging external effects to the suppressor or surroundings occur.

2. Indicator light(s) display for power and protection status with push-to-test capabilities.

3. Audible alarm with silencing switch.

4. Form C contacts; one normally open and one normally closed for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.

5. Surge counter with reset switch.

6. Optional integral disconnect switch for externally mounted SPDs. SPDs integrated into factory supplied equipment shall have an input disconnect switch or circuit breaker unless indicated on the equipment drawings/data sheets.

C. Surge Current Rating: The surge current rating of the SPD shall be dependent of its category/location, as follows:

Category/Location	Application	Per Phase	Per Mode
C	Service Entrance	240 kA	120 kA
B	Distribution	160 kA	80 kA

D. Protection Modes:

1. UL 1449 VPR for grounded WYE configured circuits shall not exceed the following:

Modes	208Y/120	480Y/277	600Y/347
L-N; L-G; N-G	800 volts	1200 volts	1500 volts
L-L	1200 volts	2000 volts	2500 volts

2. UL 1449 VPR for Delta configured circuits shall not exceed the following:

Modes	240D	480D	600D
L-G; N-G	1200 volts	2000 volts	2500 volts

E. SCCR: Per NEC 285.6, the short circuit current rating of the SPD shall be equal to or greater than the available short circuit current at the point on the system where installed.

F. Nominal Discharge Current Rating: 20 kA $I_{(n)}$.

1. Surge protective devices located at service entrance locations shall carry a minimum nominal discharge current rating of 20 kA to meet the requirements of UL 96A.

2.03 DISTRIBUTION/ BRANCH PANEL SUPPRESSORS

A. SPDs: Comply with UL 1449.

1. Type 1 or Type 2 SPDs.

2. Type 2 SPDs shall also comply with UL 1283.

B. Features and Accessories: SPDs shall provide the following features and accessories:

1. Internal fusing design capable of disconnecting the SPD before any damaging external effects to the suppressor or surroundings occur.

2. Indicator light(s) display for power and protection status.

3. Audible alarm with silencing switch.

4. Form C contacts; one normally open and one normally closed for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.

5. Surge counter with reset switch.

6. Optional integral disconnect switch for externally mounted SPDs. SPDs integrated into factory supplied equipment shall have an input disconnect switch or circuit breaker unless indicated on the equipment drawings/data sheets.

C. Surge Current Rating: The surge current rating of the SPD shall be dependent of its category/location, as follows:

Category/Location	Application	Per Phase	Per Mode
B	Distribution	160 kA	80 kA
B	Branch	120 kA	60 kA

D. Protection Modes:

1. UL 1449 VPR for grounded WYE configured circuits shall not exceed the following:

Modes	208Y/120	480Y/277	600Y/347
L-N; L-G; N-G	800 volts	1200 volts	1500 volts
L-L	1200 volts	2000 volts	2500 volts

2. UL 1449 VPR for Delta configured circuits shall not exceed the following:

Modes	240D	480D	600D
L-G; N-G	1200 volts	2000 volts	2500 volts

E. SCCR: Per NEC 285.6, the short circuit current rating of the SPD shall be equal to or greater than the available short circuit current at the point on the system where installed.

F. Nominal Discharge Current Rating: 10 kA $I_{(n)}$.

2.04 ENCLOSURES

A. Enclosure shall meet or exceed the ratings for the environment to be installed as indicated on drawings.

1. Indoor Enclosures for Externally Mounted SPDs: NEMA 250, Type 3R.

2. Outdoor Enclosures for Externally Mounted SPDs: NEMA 250, Type 3R, 4X.

3.00 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

1. Beginning of the work shall indicate acceptance of the areas and conditions by the Installer.

3.02 INSTALLATION

A. Install surge protection for low voltage electrical power circuits in accordance with reviewed product data, final shop drawings, manufacturer's written instructions and recommendations, and as indicated on the Drawings.

B. Install SPD devices at the service entrance in accordance with NEC. SPDs installed on the line side of the service entrance OCPD shall be Type 1 SPDs. SPDs installed on the load side of the OCPD shall be either Type 1 or Type 2 SPDs.

C. Follow manufacturer's recommended installation practices.

1. Provide a minimum 30 ampere circuit breaker as a dedicated disconnecting means for the SPD unless otherwise indicated.

2. Install SPDs with properly rated conductors between suppressor and points of attachment as short and straight as possible; adjust circuit breaker positions to achieve shortest and straightest leads.

3. Do not splice and extend SPD leads unless specifically permitted by manufacturer.

4. Twist input conductors together to reduce the input inductance.

3.03 FIELD QUALITY CONTROL

A. Perform the following tests and inspections.

1. Compare equipment nameplate data for compliance with the Drawings and the Specifications.

2. Inspect anchorage, alignment, grounding, and clearances.

3. Verify that electrical wiring installation complies with manufacturer's written installation requirements.

B. A SPD will be considered defective if it does not pass inspections.

C. Prepare inspection reports.

3.04 DEMONSTRATION

A. Start-Up Service:

1. Complete start-up checks according to manufacturer's written instructions.

2. Do not perform insulation resistance tests of the distribution wiring equipment with SPDs installed. Disconnect all wires, including, but not limited to, neutral of the SPD before conducting insulation resistance tests, and reconnect them immediately after the testing is over.

3. Energize SPDs after power system has been energized, stabilized, and tested.

3.05 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to the Installer, that shall ensure that the surge protection for low voltage electrical power circuits shall be without damage at time of Substantial Completion.

END OF SECTION

DIVISION 13

SECTION 13900 – CONTROL SYSTEM INTEGRATION

1.00 GENERAL

1.01 SUMMARY

a. The Systems Integrator / Controls Contractor is responsible for supplying all meters according to details in Plans and Specifications. Meters will installed by the General Contractor and integrated by the Systems Integrator. Per add # 1

A. The equipment and services described in this Section and Associated Sections are to be by a Pump and Process System Supplier, panel manufacturer and System Integrator to ensure full system compatibility (hereafter called the System Integrator) for the Pittsfield, IL WWTP supervisory control and data acquisition (SCADA) system.

The Contractor shall be responsible for accepting delivery of the equipment and for its complete installation.

The System Integrator shall be Vandevanter Engineering.

Other "approved equal" systems integrators for Alternate Bids may be used on this Project only with prior approval of the Engineer. To obtain approval of alternate systems integrators, the General Contractor shall submit in writing, prior to acceptance of Bids, references (Owners' contact name, address, and telephone number) of at least three controls installations at wastewater plants of similar size with at least 1 year of acceptable operating experience by the proposed alternate systems integrator. Provide sufficient time (minimum 3 weeks before the bid opening date) by the engineer to review the submittal, references, and issue an Addendum.
Acceptable operating experience shall be defined as:

1. The system was installed and programmed by the systems integrator.
2. The facility is presently using the installed system for data acquisition and control.
3. The installation included programming of low voltage service entrance switchgear control systems with on-site generation for synchronized closed transition switching between utility electric service and on-site generation.
4. The system control and data communication system components were furnished and programmed by the systems integrator.
5. The personnel proposed to do the programming shall be employed by the Systems Integrator.

B. Section includes basic requirements for instrumentation and control including cutover execution plan.

C. Associated Sections: The following Sections are included in the supply of the System Integrator:

1. 13910 – Instrumentation
2. 13920 – Control Panels
3. 13930 – Programmable Logic Controllers
4. 13940 – Supervisory Control System

D. Related Sections: The following Sections contain requirements that relate to this Section and Related Sections:

1. 11322 – Automatic Coarse Bar Screen
2. 11322 – Inclined Grit Screw
3. 11850 – Influent Lift Station Rehabilitation
4. 13443 – MCC

E. The SCADA system shall include instrumentation and control systems for equipment throughout the Contract Documents, including, but not limited to:

1. Instrument loop components, including primary elements, sensors, transducers, transmitters, indicators, controllers, and recorders.

2. Final operator control elements, including control valves and solenoid valves and interfaces to motors, starters, variable frequency drives, and electric operators.
3. Indicating and control devices, including push buttons, pilot lights, selector switches, and indicators.
4. Ancillary components, including signal repeaters, modules, signal isolators, relays, and timers.
5. Instrumentation power supplies including dedicated power supplies, power conditioning, uninterruptible power supplies, and grounding systems.
6. Cabinets, consoles, panels, and enclosures.
7. Controls for process equipment and systems, programmable logic controllers, and computers.

1.02 REFERENCES

A. International Society for Measurement and Control (ISA): ISA S5.4- Instrument Loop Diagrams.

1.03 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.

B. Product Data: Rated capacities of each unit, weights, furnished specialties, and accessories. Product data shall also include drawings from manufacturer detailing equipment assemblies and indicating dimensions, required clearances, method of field assembly, components, and location and size of each field connection.

C. Submit wiring diagrams detailing wiring for power and control systems and differentiating clearly between manufacturer-installed and field-installed wiring.

D. Submit integrated system (Loop) drawings. Loop drawings shall be 11" x 17" and shall conform to ISA S5.4. Upon completion of the project, submit final revised drawings in AutoCAD format. Loop drawings shall show at a minimum:

1. All field wiring external to control panels and MCCs with wiring numbers shown.

1.04 AS-BUILT DOCUMENTATION

A. Complete as-built documentation shall be provided to the Engineer/Owner upon project completion. As-Build data shall include the following:

1. Final As-Built loop drawings shall be on 11" x 17" paper and included in the operation manual.

2. Final As-Built panel wiring diagrams shall be on 11" x 17" paper and included in the operation manual. An additional as-built drawing shall be placed in each control panel. A waterproof reduced copy of the master "as built" wiring diagram shall be laminated in clear plastic and permanently fastened to the inside of the panel door.

3. Prior to final acceptance by the Owner, the systems integrator shall provide two (2) operation manuals. Included in the documentation package shall be a detailed description of operation, modified from the submittal version.

   The manual shall incorporate all wiring diagrams and system operation description. Any changes or adjustments made during installation and start-up shall be included. The manual shall include, but is not limited to, the following sections with tabs placed at the beginning of the corresponding sections:
   A) System Operation (updated from submittal version)
   B) System equipment/instrumentation major component manuals
   C) Complete set of loop drawings
   D) Complete set of drawings and bills of materials for control panels supplied
   E) System component program (PLC program - soft copy)

1.05 TRAINING

A. An on-site training program shall be provided to employees as selected by the Owner, as pertains to supplied equipment. The objective of the training is to provide a common working knowledge concerning the operation of the system. Training shall be broken into sections as follows:

1. Include one (1) four-hour training session provided at the completion of start-up.

2. Include one (1) four-hour training session provided 30 days after the initial training.

1.06 WARRANTY

A. System warranty shall be for a period of 1 year commencing upon successful completion of startup. Systems integrator shall not be responsible for contingent liabilities due to any component failure before, during, or after the manufacturer warranty period. Warranty includes parts and labor for all equipment/software/services provided against defects in material and workmanship. Warranty excludes surge/transient damage.

2.00 PRODUCTS

A. Not Applicable

3.00 EXECUTION

3.01 INSTALLATION

A. Non-bus signal transmission between instruments not located within a common panel shall be 4-20 rnA operating at 24 VDC. Milliampere signals shall be current regulated and shall not be affected by changes in supply voltage and load resistance within the unit's rating.

B. Ground measurement loops at panel external terminals by bonding to the instrument panel signal ground bus.

C. Provide isolating amplifiers within the panel for field equipment possessing a grounded input or output.

D. Provide each receiver and each transmitter with an individual switch and fuse to disconnect the receiver from power and signal sources.

E. Provide engraved lamicoid nameplates (white background/black letters) for meters, indicators, totalizers, controllers, recorders, and other panel-mounted devices.

F. Identify field-mounted devices with permanently affixed embossed stainless steel tags. Characters shall be at least 3/8-inch high.

G. Identify wiring and terminals at devices, terminal blocks, and splices. Identification shall include signal tag number and polarity (where applicable). Instrumentation cables shall be tagged at both ends and at any intermediate pullbox, junction box, or manhole. Tagging requirements apply to internal and external wiring of instruments and control panels.

3.02 CUTOVER EXECTUTION PLAN

A. General:

All equipment with monitoring by the existing system will be temporarily unmonitored during MTU or RTU replacement. Equipment with control by RTU or MTU will be transitioned to the new SCADA system as outlined below.

END OF SECTION 13900

DIVISION 13

SECTION 13910 - INSTRUMENTATION

1.00 GENERAL

1.01 SUMMARY

A. This Section includes the instrumentation requirements for all instrumentation as outlined in the appended Instrument List. Instruments shall be furnished, installed, and commissioned.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. 13900 – Control System Integration
2. 13930 – Programmable Logic Controllers
3. 13940 – Supervisory Control System

1.02 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.

B. Product Data: Rated capacities of each unit, weights, furnished specialties, and accessories. Product data shall also include drawings from manufacturer detailing equipment assemblies and indicating dimensions, required clearances, method of field assembly, components, and location and size of each field connection.

C. Submit wiring diagrams detailing wiring for power and control systems and differentiating clearly between manufacturer-installed and field-installed wiring.

D. Submit integrated system (Loop) drawings. Loop drawings shall be 11" x 17" and shall conform to ISA S5.4. Upon completion of the project, submit final revised drawings in AutoCAD format. Loop drawings shall show at a minimum:

1. All field wiring external to control panels and MCCs with wiring numbers shown.

2.00 PRODUCTS

2.01 MAGNETIC FLOW SENSOR AND TRANSMITTER

A. Sensor Construction: Carbon Steel
B. Sensor Liner Material: Hard Rubber
C. Sensor Electrode Material: Type 316 Stainless Steel
D. Sensor Grounding Ring Type and Number: Type 316 Stainless Steel; 2
E. Transmitter Output Signal: 4-20mA
F. Transmitter Power Supply: 120VAC (except as noted in the instrument list)
G. Transmitter Enclosure Rating: NEMA 4X with protective cover
H. Manufacturer: MJK
I. Model: Magflux 7200

2.02 PRESSURE SWITCH

A. Fitting: ¼" Male NPT
B. Electrical Connection: DIN 43 650 Plug with Cable Gland
C. Electrical Protection: NEMA 4
D. Switch: SPDT micro-switch
E. Manufacturer: Kobold
F. Model: KPH300-12 X/X 8P (Factory Trip Point from Instrument List)

2.03 POWER MONITOR

A. Mounting: DIN Rail
B. Supply Voltage: Line Voltage for Motor
C. Current Input: CT sized for Motor
D. Relay Ouput Rating: 5A/240VAC
E. Manufacturer: H2Flow
F. Model: M20

2.04 DISSOLVED OXYGEN (DO) SENSOR AND TRANSMITTER

A. Sensor: Optical Type measuring fluorescence
B. Sensor Mount: 1 ½" NPT PVC, see Accessories
C. Transmitter Voltage: 110VAC
D. Transmitter Output: 4-20mA
E. Transmitter Enclosure Rating: NEMA 4X
F. Manufacturer: Insite IG, Inc.
G. Accessories: Float Kit or Fixed PVC Stick as required, SS Sun Shield
H. Transmitter Model: 1000 or 2000 as required
I. Sensor Model: 10

2.05 OVERTORQUE LIMIT SWITCH

A. Operation: Indicating Overload actuated by thrust from the worm shaft

B. Limit Switches: Two (2) limit switches enclosed in a stainless steel enclosure. One switch shall have an electrically isolated N.O. contact, which shall operate a remote alarm when the load on the mechanism reaches a preset level. The other switch, which shall have an electrically isolated N.C. contact, shall open the motor circuit when a preset overload occurs. The overload switches shall be enclosed in weatherproof housings.

C. Shear Pin: A shear pin coupling shall also be provided for additional protection and set as indicated above.

2.06 AMMONIA SENSOR AND TRANSMITTER

A. Manufacturer: Hach

2.07 PROXIMITY SENSOR

A. Manufacturer: Square D

2.08 TEMPERATURE TRANSMITTER

A. Mounting: Outside Air Mount
B. Output: 4-20mA
C. Accuracy: 2%
D. Enclosure: NEMA 4X
E. Manufacturer: Dwyer
F. Model: RHP-2S1

2.09 HYDROSTATIC PRESSURE LEVEL TRANSMITTERS

A. A submersible level transmitter shall be provided to sense the liquid level at the location as shown on the plan drawings and in accordance with the manufacturer's recommendations.

B. Housing: NEMA 6P fabricated of PPS Ryton

C. Diaphragm: 99.9% pure ceramic with Viton packing.

D. Mounting: The transducer shall be capable of being pipe mounted to with 1" threaded connection or cable mounted by self-supporting suspension cable system.

E. Output Signal: 4-20mA, 2 wire, 10-30 VDC loop-powered type

F. Approval: UL 913 approved intrinsically safe rated for UL Class 1, Div 1, Group A-D.

G. Programmable: For both range and span submersible level.

H. Manufacturer: MJK

I. Model: 3400

2.10 CONDUCTANCE PROBE

A. Construction: uPVC 32mm tubing with molded sensor units at regular intervals along the probe.

B. Sensors: 10 sensors will be spaced along the length of the probe assembly, and each will be individually connected to a correspondingly numbered PVC/PVC .75mm flexible cable. The moulded sensor unit will contain two Avesta sensors mounted on opposite sides of sensor unit. Each Avesta sensor will be 24mm high and no wider than 2mm, and will protrude from the surface of the PVC. The probe shall be pressure injected with an epoxy resin to encapsulate all internal components and connections to form a rigid, homogenous unit. Each sensor unit containing the two Avesta sensors will be rotated 90 degrees to the previous sensor unit to eliminate tracking between sensors.

C. Sensor Material: Avesta SMO254 stainless steel.

D. Probe mounting: In a turbulent area of the wet well, suspended on its own cable and connected to a 6mm stainless steel hook which would hang from a 30mm stainless steel angle containing a polyurethane squeegee pad positioned in the opening into the wet well, so that the probe can be removed without entering the wet well. The squeegee will have a 30mm hole and slot, enabling the probe to be pulled through and cleaned. Probe cable shall be run in a separate conduit away from any high voltage cables.

E. Cable: Encoded with number and text along the entirety of the cable and at intervals not greater than 200mm, for identification. This cable will be dark blue in colour, with the cores light blue. The flexible cables shall be capable of supporting the weight of the probe and cable, without the need for additional support. The cable shall be secured to the top of the probe by a synthetic rubber compression fitting.

F. Warranty: The primary level sensing probe is covered by the manufacturer's ten-year warranty.

G. Manufacturer: The primary level sensing probe shall be manufactured by Xylem Multitrode, Inc.

H. IS barrier: The primary and redundant level sensors shall be installed with Intrinsic Safety Barriers. An intrinsically safe barrier shall provide a barrier between a 10 channel conductance probe located in a hazardous location and a pump controller (or conductance relay) in a non-hazardous location. The barrier shall be UL Listed as a UL913 intrinsically safe device. The barrier shall clamp voltage and current levels at a safe level. The Intrinsic Safety Barrier for the primary redundant probe shall be Model 84-800060.

2.11 PUMP CONTROL RELAYS

A. General: The relay will be programmable via dip switches located on the faceplate of the relay. The relay will have built in activation delays, four sensitivities, and LED indication (power on- green, alarm on- red, and pump on- yellow). The relay will utilize extra low voltage to the probe for level monitoring.

B. Manufacturer: Xylem Multitrode, Inc.

C. Model: 84-800103 (discharge only- controls one pump and one alarm) or or 84-8000095 (charge or discharge- controls one pump or one alarm).

3.00 EXECUTION

3.01 INSTALLATION

A. Install each instrument in accordance with the manufacturer's recommendations.

B. Mount and anchor instruments using stainless steel hardware. Secure instrument to walls, stands, or brackets as required by the manufacturer.

C. Non-bus signal transmission between instruments not located within a common panel shall be 4-20 rnA operating at 24 VDC. Milliampere signals shall be current regulated and shall not be affected by changes in supply voltage and load resistance within the unit's rating.

D. Ground measurement loops at panel external terminals by bonding to the instrument panel signal ground bus.

E. Provide isolating amplifiers within the panel for field equipment possessing a grounded input or output.

F. Scale instruments in engineering units (unless specifically stated, 0-100% scale is not acceptable).

G. Identify wiring and terminals at devices, terminal blocks, and splices. Identification shall include signal tag number and polarity (where applicable). Instrumentation cables shall be tagged at both ends and at any intermediate pull box, junction box, or manhole. Tagging requirements apply to internal and external wiring of instruments and control panels.

H. Vent connections on instruments shall be fitted with a downward pointing vent fitting to prevent water or foreign material from falling into the Instrument.

I. Whenever possible, field mounted instruments (not field panel mounted) shall be mounted at approximately 4 1/2 ft. above the grade or platform and shall be located as near to the primary connection as possible, consistent with instrument accessibility.

J. Process piping supports may be used to support instrument or instrument lines where approved by Owner. Handrails or process pipes shall not be used to support instruments or instrument lines unless approved by Owner on a case-by-case basis.

K. Contractor shall inspect all devices and connections for compliance with specifications, drawings, and manufacturer's recommended installation practice. Devices and installations shall meet applicable codes and regulations.

L. During the installation the Contractor is expected to group conduit and cable runs into a practical and workmanlike grouping.

M. If any conduit fill exceeds 40 percent of capacity, or if any solid bottom cable tray fill exceeds 40 percent of capacity, or if any ventilated cable tray fill exceeds 50 percent of capacity, the Contractor shall advise Owner or Owner's Representative before proceeding with installation of additional wire.

3.02 CALIBRATION AND COMMISSIONING OF INSTRUMENTS

A. Calibrate and commission all instruments installed under this Section.

B. Instruments shall be calibrated in strict accordance with the manufacturer's recommendations or as specified by Owner.

C. Provide labor, tools, and other equipment required to calibrate and commission the instruments after installation and prior to start-up.

D. Inspect all devices and connections for compliance with specifications, drawings, and manufacturer's recommended installation practice. Instruments intended for installation in control panels which have been shipped separately shall be subjected to an inspection of electrical and/or pneumatic connections. Instruments shall be installed in accordance with the manufacturer's recommended installation practice.

E. Verify that devices and installations meet all applicable codes and regulations and agree with specified installation details.

F. Contractor shall test and inspect the installations for proper connections and continuity to verify items function properly. Loop checks to test response to input and signals shall be performed by the Contractor.

G. Wiring shall be checked for continuity and to ensure that it is properly connected and with the correct polarity. Correct connections of all process switches shall be verified for proper routing and connection.

H. Contractor shall allow inspection of installation work by Owner or Owner's Representative at any time.

END OF SECTION 13910

Tag	Loop	Description	Device Type	Output Type	Range	Spec Provided	REV	Notes
JC	101	3HP BLOWER AMPS	POWER MONITOR	4-20mA	0-10 AMPS	13910	A	
AE	101	AERATION BASIN DISSOLVED OXYGEN	DO SENSOR	N/A	N/A	13910	A	
AIT	101	AERATION BASIN DISSOLVED OXYGEN	DO TRANSMITTER	4-20mA	0-10ppm	13910	A	
WSO	101	PRIMARY SETTLING 1 OVERTORQUE	OVERTORQUE LIMIT SWITCH	DRY CONTACT	SET BY SUPPLIER	16220	A	
PSH	101	CHEM FEED BLDG AIR HIGH PRESSURE	PRESSURE SWITCH	DRY CONTACT	TRIPS @ XX PSI Rising	13910	A	
ZSC	101	CHEMICAL FEED BLDG DOOR SWITCH 1	PROXIMITY SENSOR	DRY CONTACT	N/A	13910	A	
TIT	101	CHEMICAL FEED BLDG AMBIENT INSIDE TEMPERATURE	TEMPERATURE TRANSMITTER	4-20mA	0-XX DEG	13910	A	
ZSC	101	CHLORINE BUILDING DOOR SWITCH 1	PROXIMITY SENSOR	DRY CONTACT	N/A	13910	A	
TIT	101	CHLORINE BUILDING AMBIENT INSIDE TEMPERATURE	TEMPERATURE TRANSMITTER	4-20mA	0-XX DEG	13910	A	
JC	102	3HP BLOWER AMPS	POWER MONITOR	4-20mA	0-10 AMPS	13910	A	
WSO	102	PRIMARY SETTLING 2 OVERTORQUE	OVERTORQUE LIMIT SWITCH	DRY CONTACT	SET BY SUPPLIER	16220	A	
ZSC	102	CHEMICAL FEED BLDG DOOR SWITCH 2	PROXIMITY SENSOR	DRY CONTACT	N/A	13910	A	
ZSC	102	CHLORINE BUILDING DOOR SWITCH 2	PROXIMITY SENSOR	DRY CONTACT	N/A	13910	A	
JC	103	3HP PUMP AMPS	POWER MONITOR	4-20mA	0-10 AMPS	13910	A	
JC	104	3HP PUMP AMPS	POWER MONITOR	4-20mA	0-10 AMPS	13910	A	
JC	105	3/4HP PRIMARY SETTLING DRIVE AMPS	POWER MONITOR	4-20mA	0-3 AMPS	13910	A	
JC	106	3/4HP PRIMARY SETTLING DRIVE AMPS	POWER MONITOR	4-20mA	0-3 AMPS	13910	A	
AE	111	CHEM FEED BLDG AMMONIA	AMMONIA SENSOR	N/A	N/A	13910	A	
AIT	111	CHEM FEED BLDG AMMONIA	AMMONIA TRANSMITTER	4-20mA	0-XX ppm	13910	A	
WSO	301	CHLORINATION BASIN OVERTORQUE	OVERTORQUE LIMIT SWITCH	DRY CONTACT	SET BY SUPPLIER	16220	A	
AE	301	CHLORINATION BASIN DISSOLVED OXYGEN	DO SENSOR	N/A	N/A	13910	A	
AIT	301	CHLORINATION BASIN DISSOLVED OXYGEN	DO TRANSMITTER	4-20mA	0-10ppm	13910	A	
JC	401	5HP NPW PUMP AMPS	POWER MONITOR	4-20mA	0-10 AMPS	13910	A	
LIT	401	CLEARWELL LEVEL	HYDROSTATIC LEVEL TRANSDUCER	4-20mA	0-XX'	13910	A	XX' Cable, Note 4
PSH	401	FILTER BLDG AIR HIGH PRESSURE	PRESSURE SWITCH	DRY CONTACT	TRIPS @ XX PSI Rising	13910	A	
ZSC	401	TERTIARY FILTER BLDG DOOR SWITCH 1	PROXIMITY SENSOR	DRY CONTACT	N/A	13910	A	
TIT	401	TERTIARY FILTER BLDG AMBIENT INSIDE TEMPERATURE	TEMPERATURE TRANSMITTER	4-20mA	0-XX DEG	13910	A	
JC	402	5HP NPW PUMP AMPS	POWER MONITOR	4-20mA	0-10 AMPS	13910	A	
LIT	402	MUDWELL LEVEL	HYDROSTATIC LEVEL TRANSDUCER	4-20mA	0-XX'	13910	A	XX' Cable, Note 4
ZSC	402	TERTIARY FILTER BLDG DOOR SWITCH 2	PROXIMITY SENSOR	DRY CONTACT	N/A	13910	A	
JC	403	2HP MUDWELL PUMP AMPS	POWER MONITOR	4-20mA	0-5 AMPS	13910	A	
ZSC	403	TERTIARY FILTER BLDG OVERHEAD DOOR SWITCH 3	PROXIMITY SENSOR	DRY CONTACT	N/A	13910	A	
JC	404	2HP MUDWELL PUMP AMPS	POWER MONITOR	4-20mA	0-5 AMPS	13910	A	
JC	405	25HP BACKWASH PUMP AMPS	POWER MONITOR	4-20mA	0-40 AMPS	13910	A	
JC	406	25HP BACKWASH PUMP AMPS	POWER MONITOR	4-20mA	0-40 AMPS	13910	A	
JC	407	3HP FILTER BLOWER AMPS	POWER MONITOR	4-20mA	0-40 AMPS	13910	A	
JC	408	3HP FILTER BLOWER AMPS	POWER MONITOR	4-20mA	0-10 AMPS	13910	A	
JC	501	20HP INFLUENT PUMP AMPS	POWER MONITOR	4-20mA	0-40 AMPS	13910	A	
LT	501	INFLUENT PUMP STATION PRIMARY LEVEL	HYDROSTATIC LEVEL TRANSDUCER	4-20mA	0-XX'	13910	A	XX' Cable, Note 4
LE	501	INFLUENT PUMP STATION BACK-UP LEVEL	CONDUCTANCE PROBE	N/A	84-800024			Note 3
LSY	501	INFLUENT PUMP STATION LEAD PUMP BACK-UP LEVEL SWITCH	PUMP CONTROL RELAY	DRY CONTACT	TRIPS @ XX ', ALARM @ XX'	13910	A	Lead and Alarm
JC	502	20HP INFLUENT PUMP AMPS	POWER MONITOR	4-20mA	0-40 AMPS	13910	A	
LSY	502	INFLUENT PUMP STATION LAG1 PUMP BACK-UP LEVEL SWITCH	PUMP CONTROL RELAY	DRY CONTACT	TRIPS @ XX '	13910	A	Lag1
JC	503	45HP INFLUENT PUMP AMPS	POWER MONITOR	4-20mA	0-75 AMPS	13910	A	
LSY	503	INFLUENT PUMP STATION LAG2 PUMP BACK-UP LEVEL SWITCH	PUMP CONTROL RELAY	DRY CONTACT	TRIPS @ XX '	13910	A	Lag2
JC	504	45HP INFLUENT PUMP AMPS	POWER MONITOR	4-20mA	0-75 AMPS	13910	A	
LSY	504	INFLUENT PUMP STATION LAG3 PUMP BACK-UP LEVEL SWITCH	PUMP CONTROL RELAY	DRY CONTACT	TRIPS @ XX '	13910	A	Lag3
JC	505	1.5HP GRIT SCREW AMPS	POWER MONITOR	4-20mA	0-5 AMPS	13910	A	
JC	506	5HP BAR SCREEN AMPS	POWER MONITOR	4-20mA	0-10 AMPS	13910	A	
JC	507	1.5HP GRIT BLOWER AMPS	POWER MONITOR	4-20mA	0-5 AMPS	13910	A	
JC	601	5HP TURBINE AIR AMPS	POWER MONITOR	4-20mA	0-10 AMPS	13910	A	
JC	602	5HP TURBINE AIR AMPS	POWER MONITOR	4-20mA	0-10 AMPS	13910	A	
JC	603	5HP TURBINE AIR AMPS	POWER MONITOR	4-20mA	0-10 AMPS	13910	A	
JC	604	5HP TURBINE AIR AMPS	POWER MONITOR	4-20mA	0-10 AMPS	13910	A	
JC	701	7.5HP TURBINE AIR AMPS	POWER MONITOR	4-20mA	0-15 AMPS	13910	A	
PSH	701	DIGESTER AIR HIGH PRESSURE	PRESSURE SWITCH	DRY CONTACT	TRIPS @ XX PSI Rising	13910	A	
JC	702	7.5HP SLUDGE PUMP AMPS	POWER MONITOR	4-20mA	0-15 AMPS	13910	A	
JC	703	7.5HP SLUDGE PUMP AMPS	POWER MONITOR	4-20mA	0-15 AMPS	13910	A	
JC	704	5HP BLOWER AMPS	POWER MONITOR	4-20mA	0-10 AMPS	13910	A	
JC	705	5HP BLOWER AMPS	POWER MONITOR	4-20mA	0-10 AMPS	13910	A	
ZSC	801	EAST LIFT STATION BLDG DOOR SWITCH 1	PROXIMITY SENSOR	DRY CONTACT	N/A	13910	A	
TIT	801	EAST LIFT STATION BLDG AMBIENT INSIDE TEMPERATURE	TEMPERATURE TRANSMITTER	4-20mA	0-XX DEG	13910	A	
ZSC	901	SOUTH LIFT STATION BLDG DOOR SWITCH 1	PROXIMITY SENSOR	DRY CONTACT	N/A	13910	A	
TIT	901	SOUTH LIFT STATION BLDG AMBIENT INSIDE TEMPERATURE	TEMPERATURE TRANSMITTER	4-20mA	0-XX DEG	13910	A	
JC	M01	100HP AERATION BLOWER AMPS	POWER MONITOR	4-20mA	0-150 AMPS	13910	A	
PSH	M01	AERATION AIR HIGH PRESSURE	PRESSURE SWITCH	DRY CONTACT	TRIPS @ XX PSI Rising	13910	A	
FE	M01	PLANT INFLUENT FLOW DRY WEATHER	MAGNETIC FLOW SENSOR	N/A	8" Sensor	13910	A	XX' Cable
FIT	M01	PLANT INFLUENT FLOW DRY WEATHER	MAGNETIC FLOW TRANSMITTER	4-20mA	0-10 MGD	13910	A	
WSO	M01	SECONDARY SETTLING 1 OVERTORQUE	OVERTORQUE LIMIT SWITCH	DRY CONTACT	SET BY SUPPLIER	16220	A	

Tag	Loop	Description	Device Type	Output Type	Range	Spec Provided	REV	Notes
ZSC	M01	MAIN CONTROL BLDG DOOR SWITCH 1	PROXIMITY SENSOR	DRY CONTACT	N/A	13910	A	
TIT	M01	MAIN CONTROL BLDG AMBIENT INSIDE TEMPERATURE	TEMPERATURE TRANSMITTER	4-20mA	0-XX DEG	13910	A	
JC	M02	50HP AERATION BLOWER AMPS	POWER MONITOR	4-20mA	0-75 AMPS	13910	A	
FE	M02	PLANT INFLUENT FLOW WET WEATHER	MAGNETIC FLOW SENSOR	N/A	10" Sensor	13910	A	XX' Cable
FIT	M02	PLANT INFLUENT FLOW WET WEATHER	MAGNETIC FLOW TRANSMITTER	4-20mA	0-15 MGD	13910	A	
FE	M02	PLANT BYPASS TO LAGOON EFFLUENT	MAGNETIC FLOW SENSOR	N/A	12" Sensor	13910	A	XX' Cable
FIT	M02	PLANT BYPASS TO LAGOON EFFLUENT	MAGNETIC FLOW TRANSMITTER	4-20mA	0-20 MGD	13910	A	
WSO	M02	SECONDARY SETTLING 2 OVERTORQUE	OVERTORQUE LIMIT SWITCH	DRY CONTACT	SET BY SUPPLIER	16220	A	
ZSC	M02	MAIN CONTROL BLDG DOOR SWITCH 2	PROXIMITY SENSOR	DRY CONTACT	N/A	13910	A	
JC	M03	50HP AERATION BLOWER AMPS	POWER MONITOR	4-20mA	0-75 AMPS	13910	A	
ZSC	M03	MAIN CONTROL BLDG DOOR SWITCH 3	PROXIMITY SENSOR	DRY CONTACT	N/A	13910	A	
JC	M04	5HP SCUM PUMP AMPS	POWER MONITOR	4-20mA	0-10 AMPS	13910	A	
ZSC	M04	MAIN CONTROL BLDG DOOR SWITCH 4	PROXIMITY SENSOR	DRY CONTACT	N/A	13910	A	
JC	M05	5HP SCUM PUMP AMPS	POWER MONITOR	4-20mA	0-10 AMPS	13910	A	
ZSC	M05	MAIN CONTROL BLDG DOOR SWITCH 5	PROXIMITY SENSOR	DRY CONTACT	N/A	13910	A	
JC	M06	20HP SLUDGE PUMP AMPS	POWER MONITOR	4-20mA	0-40 AMPS	13910	A	
ZSC	M06	MAIN CONTROL BLDG OVERHEAD MAIN CONTROL BLDG DOOR SWITCH 1	PROXIMITY SENSOR	DRY CONTACT	N/A	13910	A	
JC	M07	20HP SLUDGE PUMP AMPS	POWER MONITOR	4-20mA	0-40 AMPS	13910	A	
ZSC	M07	MAIN CONTROL BLDG OVERHEAD MAIN CONTROL BLDG DOOR SWITCH 2	PROXIMITY SENSOR	DRY CONTACT	N/A	13910	A	
JC	M08	3/4HP SECONDARY SETTLING DRIVE AMPS	POWER MONITOR	4-20mA	0-3 AMPS	13910	A	
JC	M09	3/4HP SECONDARY SETTLING DRIVE AMPS	POWER MONITOR	4-20mA	0-3 AMPS	13910	A	

Notes:

1. Supply Remote Mount Transmitter
2. Provide Factory Installed Submersion Kit
3. 10 Sensor, 10' Length, 100' Cable
4. Include Vent Tube Filter and Dessicant Dryer Cartridge

IS rating or Class, remote mount, submersible kit, cable length

DIVISION 13

SECTION 13920 - CONTROL PANELS

1.00 GENERAL

1.01 SUMMARY

A. Furnish and install Control Panels as specified in this Section and shown on the Drawings. A table summarizing the control panels to be supplied is included as an Appendix to this Section.

B. Control panels shall include the enclosures, disconnects, overcurrent protection, primary and redundant controllers or Distributed I/O, pilot devices, control transformers, power supplies, relays, interconnected wiring, terminal blocks, and radios.

C. Related Sections

1. 11850 – Influent Lift Station Rehabilitation
2. 13910 – Instrumentation
3. 13920 – Control Panels
4. 13930 – Programmable Logic Controllers
5. 13940 – Control Narratives and HMI Development
6. 13950 – Operator and Network Equipment

1.02 REFERENCES

A. International Electrotechnical Commission (IEC):

1. IEC 529 - Classification of Degrees of Protection by Enclosures.

B. National Electric Manufacturers Association (NEMA):

1. NEMA 250 - Enclosures for Electrical Equipment (1 000 Volts Maximum).

C. National Fire Protection Association (NFPA):

1. NFPA 70 -National Electrical Code® (NBC).

D. Underwriters Laboratories (UL):

1. UL 486A- Wire Connectors and Soldering Lugs for Use With Copper Conductors.

2. UL 497 A- Secondary Protectors for Communications Circuits.

3. UL 508A- Industrial Control Equipment.

4. UL 1283 -Electromagnetic Interference Filters.

5. UL 1449- Transient Voltage Surge Suppressors.

1.03 SHOP DRAWINGS SUBMITTALS

A. Shop drawings shall be submitted for approval for all equipment herein specified. All drawings shall be generated in AutoCAD, (.DWG) format. The shop drawing submittal shall include a document list and include the following documents:

1. Project Cover Sheet including listings and reference to customers, engineers and manufacturers and their respective purchase order numbers, job and project numbers.

2. Bill of Materials Parts List – Listing all components in the control panel.

3. Wiring diagram representing the component with numbered rungs and component rung location cross reference numbers. Wiring diagrams shall include wire numbers and component and terminal wiring numbers. Real time cross referencing of relay contact to line numbers shall be given as well as written description of component function on each circuit of the drawings. Terminal strip layouts shall be provided for ease of connecting external devices. Interconnection details shall be provided for all external field mounted equipment, devices and instrumentation.

4. Control panel component layout drawings shall be provided showing component locations and approximate shape and size for the enclosure outer door, inner door and back panel.

1.04 AS BUILT DRAWINGS & INSTRUCTION MANUALS

A. Provide as-built drawings, instruction manuals and corrected shop drawings as listed above. Including "Installation, Operation and Maintenance manuals" for all supplied equipment and components. Description of operation shall be provided detailing the complete system operation.

B. Provide three copies of the above information in printed format, one copy in original AutoCAD format and one copy in electronic PDF format. One laminated set of final as-built wiring diagrams shall be placed on the control panel inner door.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Items shall be stored in original containers, protected from the weather and construction in a warm, dry, indoor area.

1.06 QUALITY ASSURANCE

A. Components and installation shall comply with NEC.

B. Control panels shall be fabricated by a current UL 508A and UL698A listed industrial control panel manufacturer. All devices within the panel shall be UL listed and/or recognized where applicable and shall be mounted and wired in accordance with the most current edition of UL508A, UL698A and NFPA. The panel manufacturer shall have a minimum of ten (10) years' experience manufacturing systems specifically for water and wastewater applications.

C. The Control Panels shall be fully tested by the factory prior to shipment. It shall include testing of both power and control devices as well as for all control functions. A final inspection shall be performed prior to shipment and a copy of this form shall be provided with the panel.

D. The naming of a manufacturer/supplier of equipment in this specification is not intended to eliminate competition or prohibit qualified manufacturers from offering equipment. Rather, the intent is to establish a standard of excellence for the material used, and to indicate a principal of operation desired. The contractors bid shall be based on the use of the named equipment. Unless the bidder clearly indicates in his bid that he is offering an equal product approved by the engineer via a pre-bid submittal, his bid shall be considered as providing the brand name product referenced in these specifications.

1.07 WARRANTY

A. Supplied equipment shall be warranted to be free from defects and workmanship for a period of one year from date of successful start-up and integration.

2.00 PRODUCTS

2.01 NEMA 1, 12, 3R OR 4X RATED PANEL

A. INCOMING UTILITY POWER

The incoming utility service for the control panel shall be as shown in the control panel table in the appendix.

B. ENCLOSURE

The enclosure shall be as shown in the control panel table in the appendix.

The enclosure shall be mounted as shown in the control panel table in the appendix with a minimum depth of 12" sized to adequately house all the components.

Floor Mounted Enclosures shall be provided with a leg kit. The enclosure door gaskets shall be rubber composition with a retainer or seamless foamed in place to assure a positive weatherproof seal. The gasket material shall not retain memory. The door shall open a minimum of 180 degrees. A 3-point latch with nylon rollers and padlock provisions on handle shall be provided. A door stop shall be provided to hold the door in the open position during operation and maintenance activities.

C. INNER DOOR

A polished aluminum dead front inner door shall be mounted on a continuous aircraft type hinge and shall contain cutouts for mounted equipment and provide protection of personnel from live internal wiring. Cutouts for breaker handles shall be provided to allow operation of breakers without entering the compartment. All control switches, indicator pilot lights, and other operational devices shall be mounted on the external surface of the dead front. The dead front shall open a minimum of greater than 90 degrees to allow access to equipment for maintenance. Provision of a "dead front" feature shall be provided using a full size hinged inner door to mount all operator devices. Material shall be .125" aluminum with turned down flanges on all four sides for added rigidity. The inner door and components shall have a "dead back" feature in order to avoid accidental shock hazard. The inner door shall be large enough to fill the entire opening of the enclosure. The inner door shall be mounted on an adjustable slide rail that allows adjustment of the location throughout the depth of the enclosure. No screws shall be used to secure the inner swing door mounting hardware to the enclosure in order not to violate the environmental integrity of the enclosure. Mounting hardware which penetrates the enclosure and violates the environmental rating of the enclosure shall not be allowed. All hardware shall be corrosion resistant. Quarter-turn latches shall be provided for securing the inner door in the closed position; captive screws are not acceptable. In addition, an inner door handle shall be provided for operator convenience.

D. BACK PANEL

The enclosure back plate shall be manufactured of 12 gauge mild sheet steel and be finished with a primer coat and two [2] coats of baked on white enamel. All hardware mounted to the subpanel shall be accomplished with machine thread tapped holes. Sheet metal screws are not acceptable.

E. PANEL DEVICES.

See PANEL DEVICES.

2.02 ARC ARMOR PANEL

A. ENCLOSURE

The enclosure shall be one freestanding enclosure consisting of four different compartments within one footprint. Enclosure shall be Arc Armor®

The Service compartment shall be a NEMA Type 3R rated compartment that houses the main service power components.

The MCC compartment shall be NEMA Type 3R rated compartment that houses the motor starter components.

The Control compartment shall be NEMA Type 4X rated compartment the houses all controls associated with the panel. The maximum voltage within this compartment is to be 120vac.

The Skirt compartment is a nonrated vented compartment that provides an area for the entry of well conduits. All conduits with the exception of line power will come through the Skirt compartment.

Conduit and mounting template - A drawing shall be provided with each enclosure to provide anchoring locations and conduit locations entering the enclosure. This drawing shall be available at the time of conduit and foundation layout.

B. ENCLOSURE CONSTRUCTION

All compartments are fabricated as one complete unit with singular common separation walls resulting in one complete enclosure. The NEMA Type rating integrity of each compartment shall be maintained at all times from the factory manufactured enclosure through final installation.

The entire panel enclosure shall be fabricated with stainless steel type 304 (18-8 stainless 18% chromium, 8% nickel)

Interior wall construction: all common walls shall consist of one sheet of type 304L (18-8) stainless steel with a minimum 14-gauge thickness (0.075 inches). Backs to back or double walls are not acceptable.

Interior mounting: all mounting plates, hinges and other components mounted onto the enclosure walls shall be held in place by welded in place stainless studs. There shall be no penetrations for through bolts or other means of anchoring into the compartments from the exterior of the cabinet.

Exterior door handles to be die-cast aluminum alloy powder coated black. Door handles to be fully lockable. Each door handle must be NEMA Type rated to maintain the rating of the associated compartment.

Exterior door hinges shall be continuous 304L stainless steel piano type hinges. All hinges are finished with white powder coating.

Mechanical door stops to be mounted on the Control and MCC compartment doors to secure the door in the open position at 110 degrees. Door may be closed by manually lifting up on the door stop arm. They shall be located at the bottom of each cabinet door.

A grey thermoplastic data pocket is to be mounted on the door of the MCC compartment. Two lifting eyebolt rings shall be installed on the top center of the panel and penetrate through the top of the panel. The lifting eyebolt rings shall enter into the MCC compartment, not the Control compartment. Each individual lifting eyebolt ring shall be rated the entire weight of the panel. The top drip cap shall be structurally reinforced for the lifting load at the point of attachment of the eyebolt rings. The lifting eyebolt ring shall have a gasket to prevent water entry into the MCC compartment. Lifting eyebolt ring shall be oriented in parallel to the width of the enclosure. They shall be constructed from high tensile strength steel, powder coated white.

A drip cap shall be installed as one continuous sheet of stainless steel covering the entire top of the Arc Armor® enclosure. The drip cap shall have rolled edge with a 1" trough continuous to each end. It shall be constructed of a minimum 14 gauge stainless steel with a white powder coat finish.

Back panels shall be constructed of polished aluminum, .125" thick minimum. Back panels to have ¾" rolled edge flange with ½" mounting hole at a minimum at each corner. Back panels are to be mounted to

the enclosure with a minimum of 3/8" studs and nuts. Back panels that are larger than 1200 square inches shall be constructed of white painted steel.

The Control compartment shall have a dead front inner door for mounting the controller, indicators, and switches. The inner door shall be constructed out of painted steel or 0.125" aluminum. The door shall be mounted to the enclosure via a continuous piano hinge. Two twist lock latches are to be used to secure the inner door in the closed position. The latches are to be T-handle type constructed from polyamide-6 nylon plastic 30% glass reinforced material. They shall be mountable through square holes to prevent rotation of the entire mechanism

C. ZONE 1- SERVICE COMPARTMENT

Main service entrance termination

1. The main service entrance conductors shall be terminated onto lugs mounted at the bottom center of the Service compartment. The lugs shall be aluminum compression type and shall be rated for both aluminum and copper wire terminations. The lugs shall be sized to accommodate the wire size of service entrance conductors.
2. Component shall be Square D, 9080 series.

Main Circuit Breaker

1. The main circuit breaker shall be a thermal-magnetic molded case circuit breaker rated to 600V and sized according to the NEC and the load requirements of the control panel. It shall be mounted in the compartment with a lockable handle mechanism mounted on the Service compartment door.
2. Component shall be Square D, HDL Type.

D. ZONE 2 – MCC COMPARTMENT

Enclosure requirements shall include electric interlock, interior light with door switch, battery mounting kit.

All circuit breakers shall be heavy-duty SQUARE D thermal magnetic protectors similar and equal to each motor breaker shall be adequately sized to meet the pump motor operating characteristics and shall have a minimum of 10,000 amps interrupting capacity for 230 VAC and 18,000 amps at 480 VAC. The control circuit shall individually be controlled by a heavy-duty breaker. Circuit breakers shall be indicating type, providing "on-off-trip" positions of the operating handle. When the breaker is tripped automatically, the handle shall assume a middle position indicating "trip". Thermal magnetic motor breakers shall be quick-make and quick-break on manual and automatic operation and have inverse time characteristics secured through the use of bimetallic tripping elements supplemented by a magnetic trip. Breakers shall be designed so that a fault on one pole automatically trips and opens all legs. Field installed handle ties shall not be acceptable.

Control transformers shall be provided to provide the 120 VAC and/or 24 VAC for control circuits when required. Component shall be Schneider Electric. Transformers shall have circuit breaker over current protection on the primary and secondary circuits. The secondary windings shall be grounded.

AC Adjustable Speed Drives shall be used to control the speed/torque of a NEMA Design B induction motor as shown in the plans.

The Drive must provide a V/Hz and Sensorless Vector mode of operation. The Drive shall be solid state, with a Pulse Width Modulated (PWM) output. The Drive shall be a Sensorless Vector AC to AC converter utilizing the latest insulated gate bipolar transistor (IGBT) technology. The Drive shall employ a Sensorless Vector inner loop torque control strategy that mathematically determines motor torque and flux. The Drive must also provide an optional operational mode for V/Hz Operation.

The Drive shall be rated to operate from 3-phase power at 208VAC to 600VAC, +10% /-15%, 48Hz to 63Hz. The Drive shall employ a full wave rectifier to prevent input line notching and operate at a fundamental (displacement) input power factor of 0.98 at all speeds and nominal load. The Drive efficiency shall be 98% or better at full speed and load. An internally mounted AC line reactor or DC choke shall be provided to reduce input current harmonic content, provide protection from power line transients such as utility power factor correction capacitor switching transients and reduce RFI emissions. When a DC choke is utilized it shall be of swinging choke design to mitigate harmonics substantially more than conventional choke designs and shall provide equivalent to 5% impedance.

Output voltage and current ratings shall match the adjustable frequency operating requirements of standard 200-575VAC, 3ph, 60Hz, NEMA Design B motors. The short term normal duty overload current capacity shall be 110% of rated current for one (1) minute out of ten (10) minutes. The short term heavy duty overload current capacity shall be 150% of rated current for one (1) minute out of ten (10) minutes and peak overload capacity shall be 180% for two (2) seconds out of each minute with an instantaneous overcurrent trip at 350% or higher. Output frequency shall be adjustable between 0Hz and 500Hz. Operation above motor nameplate shall require programming changes to prevent inadvertent high-speed operation. The Drive shall be furnished in a UL Type 1 (NEMA 1) listed enclosure rated for operation at ambient temperatures between -15° and 40°C at an altitude not exceeding 3300 feet, with relative humidity less than 95% and no condensation allowed. The Drive shall be protected from atmospheric contamination by Chemical gasses and Solid particles per IEC 60721-3-3; Chemical gasses Class 3C2 and Solid particles Class 3S2. The Drive shall be protected from vibration per IEC 60721-3-3, Class 3M4 (sinusoidal displacement 3.0 mm (0.12 in.), 2Hz to 9Hz; acceleration 10 m/s2 (33 ft/s2), 9Hz to 200Hz).

The Drive shall be an ACQ550 Series Manufactured by ABB.

E. ZONE 3 – CONTROL COMPARTMENT

See PANEL DEVICES.

2.03 CUSTOM CONSTRUCTED MTU PANEL

A. ENCLOSURE

The MTU enclosure shall be a custom engineered enclosure that fits in the existing space and provides a backpanel area for incoming wiring and equipment and a front desk workstation surface for the Workstation Server and Monitor and Overview Monitor.

B. BACK PANEL

The enclosure back plate shall be manufactured of 12 gauge mild sheet steel and be finished with a primer coat and two [2] coats of baked on white enamel. All hardware mounted to the subpanel shall be accomplished with machine thread tapped holes. Sheet metal screws are not acceptable.

C. ENCLOSURE CONSTRUCTION

All compartments are fabricated as one complete unit with singular common separation walls resulting in one complete enclosure. The NEMA Type rating integrity of each compartment shall be maintained at all times from the factory manufactured enclosure through final installation.

The entire panel enclosure shall be fabricated with stainless steel type 304 (18-8 stainless 18% chromium, 8% nickel)

Interior wall construction: all common walls shall consist of one sheet of type 304L (18-8) stainless steel with a minimum 14-gauge thickness (0.075 inches). Backs to back or double walls are not acceptable.

Interior mounting: all mounting plates, hinges and other components mounted onto the enclosure walls shall be held in place by welded in place stainless studs. There shall be no penetrations for through bolts or other means of anchoring into the compartments from the exterior of the cabinet.

Exterior door handles to be die-cast aluminum alloy powder coated black. Door handles to be fully lockable. Each door handle must be NEMA Type rated to maintain the rating of the associated compartment.

Exterior door hinges shall be continuous 304L stainless steel piano type hinges. All hinges are finished with white powder coating.

Mechanical door stops to be mounted on the Control and MCC compartment doors to secure the door in the open position at 110 degrees. Door may be closed by manually lifting up on the door stop arm. They shall be located at the bottom of each cabinet door.

A grey thermoplastic data pocket is to be mounted on the door of the MCC compartment. Two lifting eyebolt rings shall be installed on the top center of the panel and penetrate through the top of the panel. The lifting eyebolt rings shall enter into the MCC compartment, not the Control compartment. Each individual lifting eyebolt ring shall be rated the entire weight of the panel. The top drip cap shall be structurally reinforced for the lifting load at the point of attachment of the eyebolt rings. The lifting eyebolt ring shall have a gasket to prevent water entry into the MCC compartment. Lifting eyebolt ring shall be oriented in parallel to the width of the enclosure. They shall be constructed from high tensile strength steel, powder coated white.

A drip cap shall be installed as one continuous sheet of stainless steel covering the entire top of the Arc Armor® enclosure. The drip cap shall have rolled edge with a 1" trough continuous to each end. It shall be constructed of a minimum 14 gauge stainless steel with a white powder coat finish.

Back panels shall be constructed of polished aluminum, .125" thick minimum. Back panels to have ¾" rolled edge flange with ½" mounting hole at a minimum at each corner. Back panels are to be mounted to the enclosure with a minimum of 3/8" studs and nuts. Back panels that are larger than 1200 square inches shall be constructed of white painted steel.

The Control compartment shall have a dead front inner door for mounting the controller, indicators, and switches. The inner door shall be constructed out of painted steel or 0.125" aluminum. The door shall be mounted to the enclosure via a continuous piano hinge. Two twist lock latches are to be used to secure the inner door in the closed position. The latches are to be T-handle type constructed from polyamide-6 nylon plastic 30% glass reinforced material. They shall be mountable through square holes to prevent rotation of the entire mechanism

D. PANEL DEVICES.

See PANEL DEVICES.

2.04 PANEL DEVICES

A. CONDENSATION HEATER & THERMOSTAT

A 100 watt (minimum), 120 VAC heater shall be provided to protect the enclosure from the harmful effects of condensation corrosion and low temperatures. The heater shall be complete with an adjustable thermostat mounted on the back panel DIN Rail. The heater shall be a flexible strip type heater mounted to the back side of the inner located at the bottom and shall include a protective metallic covering. The heater and thermostat shall have a separate branch circuit protection.

B. INTERNAL LIGHT

Provide door-switch-operated 15-watt fluorescent light with auxillary contacts for primary controller input.

C. ELECTRICAL GENERAL

The panel power distribution shall include all necessary components and be completely wired with tinned MTW wire (THHN is not acceptable), stranded copper conductors rated at 90 degrees c. All conductor terminations shall be as recommended by the device manufacturer.

D. LOAD CENTER

A load center shall be provided to supply power to 120VAC miscellaneous pretreatment area devices. The load center shall contain no less than 24 circuits. Panel shall have a main breaker sized for the panel loads. 20% spare breakers shall be provided. The load center shall be rated NEMA 1 for enclosure in the Arc Armor pretreatment panel. The load center shall be a Square D type QONQ.

E. GROUND BUSS / LUGS

Provide a ground lug sized for incoming power ground near the power distribution block. Provide a ground lug sized for pump ground near the pump power wire terminations. Provide a ground buss for control equipment grounding, minimum 6 termination points.

F. CIRCUIT BREAKERS

All circuit breakers shall be heavy-duty thermal magnetic protectors similar and equal to SQUARE D. Each motor breaker shall be adequately sized to meet the pump motor operating characteristics and shall have a minimum of 10,000 amps interrupting capacity for 230 VAC and 18,000 amps at 480 VAC. The control circuit shall individually be controlled by a heavy-duty breaker.

Circuit breakers shall be indicating type, providing "on-off-trip" positions of the operating handle. When the breaker is tripped automatically, the handle shall assume a middle position indicating "trip".

Thermal magnetic motor breakers shall be quick-make and quick-break on manual and automatic operation and have inverse time characteristics secured through the use of bimetallic tripping elements supplemented by a magnetic trip.

Breakers shall be designed so that a fault on one pole automatically trips and opens all legs. Field installed handle ties shall not be acceptable.

G. MOTOR STARTERS

Motor starters shall be open frame, across the line NEMA and UL rated with individual overload protection in each leg. Motor starter contact and coil shall be replaceable from the front of the starter without removing from its mounted position. Electronic overloads shall be used and sized for the full load amperage draw of the motors and service factor. Quencharc devices shall be supplied on the coils of the contactors. Definite purpose contactors, fractional size starters and IEC contactor relays shall not be acceptable. Motor starters shall be similar and equal to Square D NEMA rated Class 8536.

H. CONTROL VOLTAGE TRANSFORMER

Control transformers shall be provided to provide the 120 VAC and/or 24 VAC for control circuits when required. Transformers shall have circuit breaker over current protection on the primary and secondary circuits. The secondary windings shall be grounded. Control Voltage Transformers larger than 2KVA shall be externally mounted on the control side of the enclosure and shall be supplied in a NEMA 3R non-ventilated weatherproof housing. Control voltage transformer shall be similar and equal to Square D or GE Type QB.

I. LIGHTNING ARRESTOR

A lightning-transient protector with tell-tale warning lights on each phase to indicate loss of protection on the individual phases shall be provided. The device shall be solid state with a response time of less then 5 nanoseconds with withstanding surge capacity of 6500 amperes. Unit shall be instant recovery, long

life and have no holdover currents. Lightning arrestor shall be similar and equal to Square D 6671 SDSA3650.

J. SIGNAL LINE PROTECTOR

Signal line protectors shall be provided for each 4-20 mA instrumentation loop entering the enclosure (for outdoor enclosures) or entering the building (for indoor enclosures).

K. PHASE MONITOR

The Phase Monitor shall be an 8 pin, plug in style unit. The Phase Monitor shall monitor Under Voltage, Over Voltage, Phase Reversal, Phase Loss, Loss of Power and Voltage Imbalance. The motor starter and control circuits shall be de-energized upon sensing of any of the faults after an adjustable time delay period and shall automatically restore service upon return to normal power and the preset reset delay. The output relay shall be a Form C contact rated at 10A at 240 VAC with adjustable trip and reset delay.

L. CONVENIENCE OUTLET AND CONNECTION PORT

A 15A GFI duplex outlet and Ethernet Port shall be provided on the inner swing door. A dedicated 15A circuit breaker shall be provided for the outlet. The Connection Port shall be a GracePort P-R2-K3RF0 or equal.

M. PILOT DEVICES

General: 30.5mm NEMA 250 Type 4/4X, corrosion resistant. They shall be similar and equal to Square D Class 9001.

A three position HOA switch shall be provided for each pump. The switch shall be NEMA 4X rated, 30mm size with 10 amp contacts except when provided on a dedicated controller it. A position indicating legend plate shall be provided. The HOA switches shall be mounted on the inner dead front door unless provided in the controller units.

Pilot light, Green representing each "pump run" shall be mounted on the inner door front. Level indicator lights or indicators shall be provided. Pilot lights shall be of the LED push to test type.

N. ELAPSED TIME METER

An elapsed time meter shall be mounted on the dead front door. The meter shall operate on 120 VAC, shall indicate in hours [6 digits] and tenths and shall be non-resettable. In addition, the elapsed time meter shall separately register the number of starts of each pump. The elapsed time meter shall be similar and equal to Eaton Type CEC.

O. WIRING

All control wiring shall be minimum 16 AWG, MTW rated for 600VAC, 90C. Color coding shall be in accordance with UL 508A specifications and the following:

- Black – All ungrounded control circuit conductors operating at the supply voltage
- Red – Ungrounded AC control circuits operating at a voltage less than the supply voltage
- Blue – Ungrounded DC control circuits
- Yellow or Orange - Ungrounded control circuits or other wiring, such as signal circuits or cabinet lighting that remain energized when the main disconnect is in the "off" position.
- White or Gray – Grounded AC current carrying control circuit conductor regardless of voltage.
- White with Blue Stripe – Grounded DC current carrying control circuit conductor
- White with Yellow Stripe or White with Orange Stripe – Grounded AC control circuit current carrying conductor that remains energized when main disconnect switch is in the off position.

Analog signal voltage and current loops, minimum #16 twisted shielded pair wiring with full foil shield and drain conductor shall be used for each circuit.

Spiral wrap, cable ties, fasteners and wire duct shall be provided as required for aesthetics and safety. Secure cable ties using screwed or bolted connection, adhesive cable tie mounting pads are not acceptable except on exterior panel walls where penetrations are undesirable. Wiring shall be installed along vertical or horizontal runs only, separate and shield DC signal wiring from AC control wiring. Wire duct shall not exceed 60% fill with panel and field wiring.

Splicing or tap wiring is not acceptable except at device terminals or terminal blocks.

All wiring across hinges or to movable panels shall have Class C stranding

P. IDENTIFICATION

All component parts in the control panel shall be permanently identified with engraved legend plates black letters on white background as designated on the drawings. These labels shall include all pertinent data applicable to ratings and sizes. Voltage identification labels and comprehensive warning labels shall also be provided.

Conductors shall be labeled at both ends of every wire using Brady B-498 System smudge-proof self-adhesive vinyl cloth printed adhesive wire markers or equal.

All terminal strips shall be permanently identified with engraved legend plates. Individual terminals shall be numerically coded and identified using integral tag holders.

Q. RELAYS

All control and time delay relays shall be 3PDT rated 10A @ 120VAC, 11-pin socket mount type. Sockets shall have pressure plate terminals that accept two 14 AWG wires and shall be rated a minimum of 300V. General purpose and interposing relays shall have visual flag indication either or both electronic and mechanical and shall include a momentary and maintained mechanical override capability.

R. TERMINALS

Terminals shall be supplied for all field terminations and rated at the proper amperage not less than 300VAC, box lug terminals shall accept two 14 AWG wires. Not more than two wires per terminal. All field and customer terminals shall have minimum 3" Clearance to the opening edge of the enclosure and other components and be mounted on high rise or angled terminal strip adapters for easy access.

S. EQUIPMENT LOCATION

Locate devices, hardware, power supplies, instrumentation, controls, electrical equipment and wiring so that there is ample room for servicing each item. Each component in and on enclosures shall be able to be removed without affecting, relocating or removing other components and meet applicable UL guidelines for component layout.

T. EXPANSION CAPABILITY

Provide expansion capability for future use, including usable mounting space, power supply capacity, DIN rail space, field terminals, approximately 20% of quantity of installed equipment and devices. Adequate spacing shall be provided between all components and terminals and to the outer edges of the panel. 12" Minimum spare DIN rail space shall be provided for future use.

U. UNINTERRUPTIBLE POWER SUPPLY

The RTU and MTU control panels shall be provided with a DIN Rail mount UPS for providing uninterrupted power to the PLC and Ethernet Switch. The UPS shall be normally powered by 120VAC

and shall supply 24VDC. The UPS and battery shall be sized to provide 5 minutes of runtime to these devices. The UPS shall be a PULS UB series or equal.

V. RTU-5 ALARM SYSTEM

The alarm light shall be a weatherproof, shatterproof, red light fixture to indicate alarm conditions. The alarm light shall be turned on by the high level alarm or main utility power fail and flash until the condition has been corrected.

The alarm horn shall provide a signal of not less than 90db at 10 feet. A momentary pushbutton for alarm silence switch shall deactivate the alarm horn; however, the alarm light will flash until all fault conditions cease to exist. At that time the alarm system horn and light shall automatically reset to armed condition. A maintained selector switch shall be mounted on the inner door to select normal or muted operation of the alarm horn. The horn silence pushbutton and maintained selector switch shall not affect the operation of the alarm beacon.

Both the alarm beacon and alarm horn shall be mounted external to the panel enclosure and shall not degrade the NEMA rating of the enclosure.

W. RTU-5 MINI-CAS

One Mini-Cas 120 unit shall be supplied for each pump to monitor the pump for over-temp and leakage. The unit shall have an 11 pin, round base to mate with a standard 11 pin socket. The unit shall also be flanged in order to allow inner door mounting with use of 11 pin reverse socket, Omron part number P3GA-11.

The unit is to be able to be powered by 24VAC, 24VDC, or 120VAC, and to contain LED indication for power on, over-temp, and leakage conditions. The unit shall contain an over-temp reset bush-button to reset the unit after the fault has cleared, as well as a selector switch that that allows the selection of manual or auto reset.

The sensor input circuitry is to contain both hardware and software filters for noise immunity, as well as sensor input short circuit protection. The Mini-Cas 120 unit shall be model 14-407129, as supplied by Flygt Corporation.

X. DISTRIBUTED I/O SYSTEM

The RTU panels listed in the table appended to this Section shall communicate I/O to the MTU PLC via distributed I/O as specified in 13930.

Y. RTU INDUSTRIAL ETHERNET SWITCH

The RTU control panels shall be provided with an Ethernet Switch for connection to the Plant SCADA system, the PLC, Radio, and Connection Port for PLC programming. The Ethernet Switch shall be Industrial rated, DIN rail mountable and provide a minimum of four (4) 10/100 Base TX RJ-45 ports and one (1) 100 Base FX ST ports for Multimode Fiber connection. The Switch shall be an NTron 105FX or equal.

Z. MTU INDUSTRIAL ETHERNET SWITCH

The MTU control panel shall be provided with an Ethernet Switch for connection to the Plant RTUs, the radio, the PLC, and the Connection Port for PLC programming. The Ethernet Switch shall be Industrial rated, DIN rail mountable and provide a minimum of eight (8) 10/100 Base TX RJ-45 ports each and six (6) 100 Base FX ST ports for Multimode Fiber connection. The Switch shall be an NTron 114FX6 or equal.

AA. RADIO

The MTU, RTU-1, RTU-3, RTU-4, RTU-6, and RTU-7 control panels shall be provided with a spread spectrum Ethernet radio for connection to remote lift stations. All hardware components for the radio shall be supplied, installed, and programmed as an integral component of the control panel. The radio shall operate using both wireless IP and 900 MHz communications. The radio shall be a CalAmp ViperSC or equal.

GPS coordinates for the south and east lift stations must be obtained and a path study completed.

BB. COAXIAL SURGE PROTECTOR

A coaxial surge protector shall be supplied and installed in the MTU control panel for coaxial cable connection to the radio.

Coaxial surge protector shall be Polyphasor #IS-50NX-C2-ME.

CC. COAXIAL CABLE CONNECTORS

Coaxial cable connectors shall be supplied loose for installation by the contractor. Quantity shall be as required for the site. Weatherproof N-Connectors shall be used. The following shall apply:

For RG213U coaxial cable: Coaxial cable connectors shall be as manufactured by RF Industries #RFN-1002-1S (Male), #RFN-1024-1 (Female), or equal as recommended by radio manufacturer, quantity as required.

For LDF4-50A coaxial cable: Coaxial cable connectors shall be as manufactured by Andrew L4NM (Male), L4NF (Female), or equal as recommended by radio manufacturer, quantity as required.

DD. COAXIAL CABLE

Coaxial cable appropriate for the radio frequency shall be supplied loose for installation by the contractor. Quantity shall be as required for the site. The following shall apply:

Lengths under approximately 100': Coaxial cable shall be type RG213U, Belden #8267, or equal, as recommended by radio manufacturer.

Lengths over approximately 100': Coaxial cable shall be type LDF4-50A, as manufactured by Andrew Corporation, or equal, as recommended by radio manufacturer.

EE. COAXIAL CABLE SEALANT

Each coaxial cable connection exposed to weather shall be sealed and taped with a weather resistant electrical tape and wrap.

Wrap shall be as manufactured by 3M Company #8425-7 and #8426-9 (or as required for coaxial cable size)

FF. ANTENNA

A radio antenna with N-connection shall be supplied for installation by the contractor near the WWTP lab, Chemical Feed Building, Chlorine Building, Tertiary Filter Building, Aerobic Digester, and Digester Control Building, utilizing antenna types as appropriate for the site at which the antenna is located. Antenna shall be capable of being mounted to a 1.5" to 2.5" mast. Acceptable types are omni-directional and yagi.

Antenna shall be as manufactured by Decibel, Comtelco, or equal.

GG. ANTENNA SUPPORT/TOWER

Each antenna shall be mounted to a support pole/tower. Height shall be as required for reliable signal reception at all times. Each antenna mount shall be grounded to a 3/4" x 10' ground rod driven 1' below grade adjacent to base.

If elevation of antenna is less than 20 ft. above the station, building, or nearest available structure: Galvanized heavywall conduit firmly secured by at least two points along the length of the pole may be used. Pole shall be mounted to electrical rack, enclosure, or building. Galvanized heavywall conduit to be supplied by the electrical contractor.

If elevation of antenna is more than 20 ft. above the station, building or nearest available structure: A self-supporting tower shall be supplied by the system integrator for installation by the contractor. Self-supporting tower shall be fastened to an approximate 3'x 3'x 3' deep concrete base as specified by the manufacturer.

Antenna height shall be as determined by the System Integrator via path study.

Structure shall be as manufactured by Rohn or approved equal.

HH. OPERATOR INTERFACE TERMINAL (OIT)

Each RTU with CompactLogix I/O shall use an OIT for local monitoring and control of equipment. OIT shall be Allen-Bradley Panelview Plus 6 Compact 1000 with Ethernet communication.

2.05 SOUTH AND EAST LIFT STATION CONTROL PANEL MODIFICATIONS

The following components will be supplied by the System Integrator for installation by the System Integrator or Contractor as noted in the existing South and East Lift Station Control Panels. Start-up and commissioning of all equipment listed below is by the System Integrator.

A. INDUSTRIAL ETHERNET SWITCH

The lift station control panels shall be provided with an Ethernet Switch for connection to the Plant SCADA system and Lift Station Controller. The Ethernet Switch shall be Industrial rated, DIN rail mountable and provide a minimum of five (5) 10/100 Base TX RJ-45 ports. The Switch shall be an NTron 105TX-SL or equal.

B. RADIO

The lift station control panels shall be provided with an Ethernet radio for connection to the Plant MTU. All hardware components for the radio shall be supplied, installed, and programmed as an integral component of the control panel. The radio shall operate using both wireless IP and 900Mhz communications. The radio shall be a CalAmp ViperSC or equal.

C. COAXIAL SURGE PROTECTOR

A coaxial surge protector shall be supplied and installed in the lift station control panels for coaxial cable connection to the radio.

Coaxial surge protector shall be Polyphasor #IS-50NX-C2-ME.

D. COAXIAL CABLE CONNECTORS

Coaxial cable connectors shall be supplied loose for installation by the contractor. Quantity shall be as required for the site. Weatherproof N-Connectors shall be used. The following shall apply:

For RG213U coaxial cable: Coaxial cable connectors shall be as manufactured by RF Industries #RFN-1002-1S (Male), #RFN-1024-1 (Female), or equal as recommended by radio manufacturer, quantity as required.

For LDF4-50A coaxial cable: Coaxial cable connectors shall be as manufactured by Andrew L4NM (Male), L4NF (Female), or equal as recommended by radio manufacturer, quantity as required.

E. COAXIAL CABLE

Coaxial cable appropriate for the radio frequency shall be supplied loose for installation by the contractor. Quantity shall be as required for the site. The following shall apply:

Lengths under approximately 100': Coaxial cable shall be type RG213U, Belden #8267, or equal, as recommended by radio manufacturer.

Lengths over approximately 100': Coaxial cable shall be type LDF4-50A, as manufactured by Andrew Corporation, or equal, as recommended by radio manufacturer.

F. COAXIAL CABLE SEALANT

Each coaxial cable connection exposed to weather shall be sealed and taped with a weather resistant electrical tape and wrap.

Wrap shall be as manufactured by 3M Company #8425-7 and #8426-9 (or as required for coaxial cable size)

G. ANTENNA

A radio antenna with N-connection shall be supplied for installation by the contractor at the lift station control panels, utilizing antenna types as appropriate for the site at which the antenna is located. Antenna shall be capable of being mounted to a 1.5" to 2.5" mast. Acceptable types are omni-directional and yagi.

Antenna shall be as manufactured by Decibel, Comtelco, or equal.

H. ANTENNA SUPPORT/TOWER

Each antenna shall be mounted to a support pole/tower. Height shall be as required for reliable signal reception at all times. Each antenna mount shall be grounded to a 3/4" x 10' ground rod driven 1' below grade adjacent to base.

If elevation of antenna is less than 20 ft. above the station, building, or nearest available structure: Galvanized heavywall conduit firmly secured by at least two points along the length of the pole may be used. Pole shall be mounted to electrical rack, enclosure, or building. Galvanized heavywall conduit to be supplied by the electrical contractor.

If elevation of antenna is more than 20 ft. above the station, building or nearest available structure: A self-supporting tower shall be supplied by the system integrator for installation by the contractor. Self-supporting tower shall be fastened to an approximate 3'x 3'x 3' deep concrete base as specified by the manufacturer.

Antenna height shall be as determined by the System Integrator via path study.

Structure shall be as manufactured by Rohn or approved equal.

3.00 EXECUTION

A. INSTALLATION

Wire all I/O module points to terminal blocks, including spares.

All conduit entries into the panel enclosure shall maintain the rating of the enclosure.

Conduits with intrinsically safe wiring shall terminate in the control panel at the intrinsically safe wiring section. Non-intrinsically safe wiring shall not enter the control panel at the intrinsically safe wiring section and shall maintain a minimum separation distance inside the control panel from intrinsically safe conductors as required by NEC 504 and ANSI/ISA RP12.6

B. MOUNTING

Unless precluded by field obstructions, mount enclosures so that the top of the enclosure is between 60 and 72 inches above the operating floor. Enclosures taller than 72 inches shall be floor-mounted.

For wall-mounted control panel enclosures, use stainless steel hardware with wall anchors attached to concrete or masonry walls.

For floor-mounted control panel enclosures, provide concrete housekeeping pad a minimum of 3 inches (75 mm) high and 2 inches (50 mm) larger in width and depth than the enclosure with stainless steel floor anchors. Use floor stands where necessary to maintain proper working height.

For other locations, install stainless steel metal framing with stainless steel hardware anchored to the handrail or concrete floor or set in concrete anchors.

C. START-UP

The System Integrator shall provide comprehensive start-up of the MTU and RTU control panels.

All equipment shall be tested to the operational requirements. Each control function shall be activated to check for proper indication.

END OF SECTION 13920

Location	Tag	Enclosure Rating	Utility Voltage	Controller/ Distributed I/O connection	Mount Type	Estimated Size (H"xW"xD")	Antenna Mast Height
Lab	MTU	N/A	120VAC, Single Phase, Two Wire, 60Hz	PLC	Custom Built		Pending Path Study
Chem Feed Bldg	RTU-1	NEMA 12	120VAC, Single Phase, Two Wire, 60Hz	DIO	Wall		Above BLDG
Chlorine Bldg	RTU-3	NEMA 12	120VAC, Single Phase, Two Wire, 60Hz	DIO	Wall		Above BLDG
Tertiary Filter Bldg	RTU-4	NEMA 12	120VAC, Single Phase, Two Wire, 60Hz	DIO	Wall		Above BLDG
Pretreatment Bldg	RTU-5	ARC ARMOR	480VAC, Three Phase, Three Wire, 60Hz	MultiSmart	Floor		N/A
Aerobic Digester	RTU-6	NEMA 12	120VAC, Single Phase, Two Wire, 60Hz	DIO	Wall		Above BLDG
Digester Control Bldg	RTU-7	NEMA 12	120VAC, Single Phase, Two Wire, 60Hz	DIO	Wall		Above BLDG

DIVISION 13

SECTION 13930- PROGRAMMABLE LOGIC CONTROLLERS

1.00 GENERAL

1.01 SUMMARY

A. This Section includes hardware and software requirements for the programmable logic controllers (PLCs) and distributed input/output (I/O) hardware used to gather the plant I/O at RTU's 1-9 and the Main MCC as outlined in the appended I/O List.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. 13900 – Control System Integration
2. 13920 – Control Panels
3. 13443 - MCC

1.02 REFERENCES

A. Allen-Bradley/Rockwell Automation (http://ab.rockwellautomation.com) and Wonderware (http://global.wonderware.cornl) Documentation References.
1. 1769-UM011I-EN-P CompactLogix System User Manual Reference Document

B. Multitrode MultiSmart iPSM, MultiSmart I/O Manual V3.1.0 R20 (http://www.multitrode.com/resources/product-manuals/)

C. National Fire Protection Association NFPA 70 – National Electric Code (NEC)

1.03 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.

B. Product Data: Submit manufacturer's product data sheets for equipment described in Part 2 of this Section including memory size, input and output capacities and communications capabilities for each processor.

C. Operation and Maintenance: Include programming documentation on CD-ROM or other approved media. Documentation shall include annotation and comments.

1.04 QUALITY ASSURANCE

A. Provide components that comply with NFPA 70 and that are listed and labeled by UL508A standards.

2.00 PRODUCTS

2.01 SYSTEM REQUIREMENTS

A. A minimum of 20% spare assignable input/output points for each I/O type shall be provided for each PLC system. A minimum of 20% spare PLC chassis space shall also be provided. I/O cards and chassis space shall be included for uninstalled spare equipment and for future equipment as outlined in the appended I/O list.

2.02 MULTITRODE MULTISMART iPSM

A. Overview: The MultiSmart Pump Station Manager shall provide "Out of the box" control of a typical pump station, with an intuitive user-interface. The product shall come with pre-built configuration parameters which are selectable via the user interface, including:

- Functionality for advanced pump control of up to 6 pumps
- Pump mode, for each pump, between Auto/ Manual / Off
    - In manual control (semi-automatic manual) pump switches off at deactivation setpoint and reverts to Auto mode to prevent accidental pump run on
    - To pump beyond off set point in manual button must be held down (full manual)
- Setpoint adjustment for pump activation/deactivation and level alarms
- Level device from 4-20mA, conductive probe or remote level
    - Redundant level device handling
- Selectable between fill / empty
- Functionality for advanced pump control of up to 6 pumps including grouping and alternation
- Station optimization including
    - Max off time (odour reduction)
    - Maximum pumps to run (overload protection)
    - Maximum starts per hour (pump protection)
    - Inter-pump start and stop delays
    - Maximum run time (turn off inefficient or partially blocked pumps)
    - Blocked pump detection
    - Well washer controls
    - Well clean out (periodic pump down to snore point)
    - Pump groups with different configurations (e.g. alternation schemes) for each group
- "Locked level" alarm to indicate level device problem
    - User-defined % change within a time period
    - Different values for low use, high use times (user defined)
- Alternation schemes including:
    - Fixed lead/duty
    - Alternation
    - Alternation N:1 (e.g., 3:1)
    - Run most efficient pump, N:1 ratio, e.g. more efficient pump runs 20 times for each operation of the less efficient pump(s)
    - Alternation by hours run or starts
- Pump decommission/commission
    - Decommissioned pump automatically removed from control algorithm, alarms, displays, etc
    - SCADA tag flags decommissioned status
- Six profiles of setpoints for spill management, off peak pumping, tariffing, etc
    - Automatic profile change on date/time
    - Selectable from SCADA, digital input, logic tag or faceplate
    - Profile includes some pump control parameters – max no of pumps, max run time, max off time
- Datalogger for user-defined faults and events (process values)
    - 50,000 events to internal flash memory
    - 10,000,000 events by writing direct to Compact Flash card
    - Download event and fault log as csv to Compact Flash for Excel analysis
    - ftp transfer of event and fault log as csv for Excel analysis
- 3-phase supply monitoring and supply protection
    - Under-voltage
    - Over-voltage
    - Phase fail
    - Phase rotation
- Monitoring of dc supply, battery voltage, and internal temperature
- Energy, power and pump efficiency monitoring:
    - kW, kVA, power factor, kWHr, KVAH calculation for each pump
    - pump efficiency calculation (litres or gals per KWHr) for each pump

- Motor protection including:
    - 3-phase current monitoring for each pump
    - Over- and under-current trip
    - Ground/earth fault
    - Current phase imbalance fault
    - I^2T fault
    - Insulation resistance testing for motor windings
        - Values and user-definable fault threshold
- Flow measurement/calculation
    - Calculated flow via draw down test
- VFD control algorithm
- Fault module with flexibility for any fault to
    - hold out pump(s) or be display only
    - auto-restart after user-defined time subsequent to fault condition clearing
    - auto-restart user-defined number of times (subsequent to fault condition clearing) before locking out
    - manual/ SCADA reset required
- Remote control via SCADA for
    - changing mode of pumps (auto/off/manual)
    - reset of pump and station faults
    - changing pump and alarm setpoints
    - changing setpoint profiles
- Security
    - Admin user sets PINs for access to configuration of the unit
    - Automatic datalogging of who has entered the configuration menu
    - Automatic logging of all unsuccessful login attempts with date/time
    - Digital input option, e.g. key switch, for access to configuration menu
- Compact Flash port allows
    - Firmware upgrades
    - Save/load configuration (allows backup to be restored, or configuration copied from another station)
    - Download datalogger in CSV
    - Export/import Modbus and DNP3 points list in csv format

B. Programmability: The product shall have the option of IEC61131-3 and IEC61499 compliant PLC programming language to enhance/interact with all the modules in the pump station manager. The product shall have the option of a simple logic engine to enhance/interact with all the modules in the pump station manager.

C. I/O: The I/O shall be expandable to many hundreds of I/O points per unit. Available I/O types shall include:

- Digital inputs (voltage free input), also configurable as counters
- Digital outputs (240V, 5A resistive)
- Analog inputs (10bit)
- Analog outputs (10bit)

1. Digital Inputs configurable for seal, thermistor, and other pump station requirements. Additionally, the Digital Inputs shall be selectable as pump station specific I/O to reduce components in the panel and therefore save cost, e.g. remove pump relays such as mini-CAS relays, MAS relays.
    - Seal sensor (conductive)
    - PTC Thermistor
    - Flygt FLS & CLS
    - Conductive probe (for liquid level sensing)
2. Specific I/O for motor protection and current/voltage monitoring. The product shall have I/O cards to minimise additional components which include:
    - Insulation resistance test (IRT) to 1000v

- 3-phase current monitoring, derived from CT's, 0.5% resolution
- 3-phase supply monitoring, 0.5% resolution. Up to 630V phase to phase.

D. User interface: The field hardware shall include a user interface for operations and configuration. The display shall provide status of most aspects of the pump station, control of pumps, resetting of faults, and configuration of parameters.

1. Status: The following parameters shall be displayed on the main screen:

   - Level in user definable units eg %, metres or custom units
   - Setpoints for alarms and pump start/stop
   - Pump running/stopped
   - Pump available/unavailable
   - 3-phase current for each motor
   - Faults
   - 3-phase supply
   - Date/time
   - User-configurable option to display pump efficiency, flow rates, total starts, total hours run and other parameters

2. The screen will also have buttons to allow the user to access Faults, History, Information and Settings.

3. Information screens: The following parameters shall be available via a user key press from the main screen:
   - Hours Run accumulators for each pump & the station with the following comparisons
     - last minutes run
     - this hour, last hour
     - today, yesterday
     - this week, last week
     - total hours run
   - Starts accumulators for each pump & the station with the following comparisons
     - this hour, last hour
     - today, yesterday
     - this week, last week
     - total starts
   - Flow values, either derived from calculations or via a flowmeter
     - Inflow
     - pump flow rate
     - total volume
     - overflow data, including start time, duration, estimated volume
   - Power & efficiency
     - pump efficiency in litres or gals per kWHr - or KVAH
     - power in kW, KVA
     - power factor
     - energy accumulators per pump in KWHr and KVAH
   - Insulation resistance value for each motor from 1000v test
   - Status of all I/O
     - Digital I/O open/closed and accumulator
     - Analog I/O mA and scaled
     - 3-phase voltage, current, frequency, phase angle, power factor
   - Database viewer to view all datapoints/tags in real time
   - Communications stats

4. Control: The following aspects of the system, as a minimum, shall be controlled intuitively through the user-interface:

   - Pump mode, for each pump, between Auto/ Manual (Hand)/ Off
   - Pump fault reset
   - Level alarm reset

5. VFD Equalization: The pump control unit shall be capable of regulating the speed of individual pumps and fine tune the transition stage of hydraulic flow when more than one pump is running. A single 4-20ma analog output from the pump controller shall be used to control multiple VFD drives. As multiple pumps are activated, the analog output signal shall be recalculated so that the net flow through the discharge piping is averaged over the activated pumps and the controlling signal shall be adjusted such that all of the pumps are running at the same speed to produce the required flow.

6. VFD Equalization Programming: The VFD pump control unit shall be programmed with the following pump settings:

   - Start and Stop level %
   - Start Speed %
   - Maximum speed level %

7. Fault screen: The main screen shall include a Fault button which takes the user to a Fault screen and allows them to check all current and unacknowledged alarms. The fault screen will detail the fault (e.g. contactor fail, seal fault, motor overtemp, over-current, etc) along with date/time each fault occurred and cleared.

   A reset option for a fault will be presented to the user when faults can be acknowledged/reset.

8. History screen: The main screen shall include a History button which takes the user to a History screen
   - View all date/time stamped faults and events
   - Filter by pump or other station parameters, by time period
   - Export via CSV for analysis in Excel

9. Configuration: The user interface should allow intuitive configuration of the system, including as a minimum:

   - Setup Wizard to allow a complete configuration (display, IO and configuration of functional blocks) by the user answering simple questions
   - Set-points, including alarm and pump setpoints
   - Enable/disable level alarms (so that for example, the low level alarm can be easily activated or deactivated)
   - Start, stop and alarm delays
   - Alternation/ fixed sequence and grouping of pumps where necessary
   - Configure I/O
     - Assign primary/backup level to any input, e.g. 4-20mA or conductive probe
     - Assign pre-defined (or user-defined) faults, e.g. thermal overload, contactor fail, to any digital input
     - Zero and span analog inputs
     - Set Digital outputs to change state with any digital tag in the system
     - Set Analog outputs to follow any analog value, including primary level
   - Fault configuration for each fault to either
     - display only
     - manual/SCADA reset before pump becomes available
     - auto-restart (after fault condition clears) with configurable restart time
     - auto-restart user-selectable number of times within time window before locking out

    - customized text for fault and event name
- Pump station optimization parameters such as:
    - Max off time (odour reduction)
    - Maximum pumps to run (overload protection)
    - Maximum starts per hour (pump protection)
    - Inter-pump start and stop delays
    - Maximum run time (turn off inefficient or partially blocked pumps)
    - Well washer controls
    - Well clean out (periodic pump down to snore point)
    - Random duty start (random time after activation point reached before pump starts) to reduce fat build up
    - Optimization parameters applied differently to different groups of pumps if required
- Supply protection
    - Under- and over-voltage alarm points
    - Volts phase imbalance and volts phase rotation
    - DC-supply alarm point
- Motor protection
    - Under-current
    - Over-current
    - Ground/earth fault
    - Phase fail
    - I^2T protection
- Communications ports, speeds and addresses

E. Back-up: The configuration of the unit will also allow the user to save a known good configuration on the unit itself that they can revert back to at any time.

Configuration backup and restore & Firmware upgrades: The Configuration interface will allow the user to save and restore configurations onto Compact Flash card, to allow easy configuration from saved versions (or copying settings from one site to another).

Firmware upgrades will be possible by copying the upgrade image onto a Compact Flash card, inserting into a field unit and cycling power.

F. Maintainability: The supplier shall also demonstrate that their system is maintainable in the future, especially that future applications do not incur any user-interface development cost on the customer, i.e., the user-interface shall be an integral part of the system.

Updates to firmware shall be provided free of charge for the life of the unit.

G. Communications:
Integral RTU/outstation
Physical
The product shall include:
- Ethernet 10Mbit/s
- Three RS232 ports to 115kBit/s

H. Media: The system shall support a variety of media and communications networks including:
- TCP/IP
- UDP
- RS232
- Private radio over RS232
- PSTN
- Wireless LAN
- Cellular data (via integral pppm module)
- Cellular voice

I. Protocols: DNP3 master & slave, level 2 compliant, including:

- Change of state reporting
- Native date/time and quality stamps for each data point
- Event buffering for different classes of data
- Support for multiple masters and slaves to be configured on the unit
- DNP Security (for securing communications between master station and RTU)

Modbus master & slave including:

- Modbus TCP
- Modbus RTU
- Modbus ASCII
- Support for multiple masters and slaves to be configured on the unit.

Communications redundancy supported
Full Remote Control of Pump Station
Pump control and configuration tags allow integrated remote control via SCADA including:

- Start / stop pumps (change mode to auto/ off/ manual)
- Reset pump and station faults
- Change pump & alarm setpoints
- Change setpoint profile

J. Warranty: The unit shall come with a 5-year warranty.

2.03 PROGRAMMABLE LOGIC CONTROLLER

A. General

1. The PLC for the project shall be Allen-Bradley CompactLogix L3x manufactured by Rockwell Automation with components as outlined in this Section.

2. PLC configured to provide communications between PLC and SCADA/HMI PC via Ethernet connection. Also, capable of logic functions such as relays, timers, counters, current switches, calculation modules, PID controllers, stepping switches, and drum programmers.

3. Provide Central Processing Unit (CPU), power, supply, input/output modules, programming software and adapter modules, and factory assembled interconnecting cables. Provide components required to make a complete and totally operational system.

4. Distributed I/O systems

B. Power Supply

One unit for each input/output base assembly:

1. MTU:

   a. Voltage: 120VAC

   b. Part Number: 1769-PA4

2. RTU/MCC:

   a. Voltage: 24VDC

b. Part Number: 1769-PB4

C. Input/Output

Complete input/output system

1. Modular, card type.
2. Discrete Input Module (24VDC sink/source): 1769-IQ16
3. Discrete Output Module (isolated): 1769-OW8I
4. Analog Input Module (non-isolated): 1769-IF16C
5. Analog Output Module (current output): 1769-OF8C

D. Distributed I/O Systems: RTU's as outlined in Section 13920 and the MCC as outlined in Section 13443 will use modular I/O and communicate to the processor located in the main control building at the MTU. Distributed I/O systems will use the 1769-AENTR adapter with the power supply and modular I/O as specified in this Section and its appendix.

E. Identification:

1. Nameplates installed above or below each PLC component (CPU, I/O rack, power supply, etc.)
2. Identify configured I/O points as they have been configured (addressed) in the system, as approved by the engineer.

F. Programming Computer and Software

1. Use programming computer supplied as part of the project. Load programming software and provide all modules and ancillaries to make a completely operating system. Include all software and cables required for programming of PLC's.

3.00 EXECUTION

3.01 INSTALLATION

A. Install all PLCs in control enclosures as outlined in the Drawings and Section 13920.

B. Wire all I/O module points to terminal blocks, including spares.

C. All digital outputs shall be wired through an interposing relay.

END OF SECTION 13930

LOCATION	DEVICE	INSTRUMENT DESCRIPTION	DI	DO	AI	AO	24V	120V	PLC	REV.	NOTES
MAIN CONTROL BLDG	JC-M01	100HP AERATION BLOWER AMPS			1				MTU	A	
MAIN CONTROL BLDG	JC-M06	20HP SLUDGE PUMP AMPS			1				MCC	A	
MAIN CONTROL BLDG	JC-M07	20HP SLUDGE PUMP AMPS			1				MCC	A	
MAIN CONTROL BLDG	JC-M08	3/4HP SECONDARY SETTLING DRIVE AMPS			1				MCC	A	
MAIN CONTROL BLDG	JC-M09	3/4HP SECONDARY SETTLING DRIVE AMPS			1				MCC	A	
MAIN CONTROL BLDG	JC-M02	50HP AERATION BLOWER AMPS			1				MCC	A	
MAIN CONTROL BLDG	JC-M03	50HP AERATION BLOWER AMPS			1				MCC	A	
MAIN CONTROL BLDG	JC-M04	5HP SCUM PUMP AMPS			1				MCC	A	
MAIN CONTROL BLDG	JC-M05	5HP SCUM PUMP AMPS			1				MCC	A	
MAIN CONTROL BLDG	PSH-M01	AERATION HIGH AIR PRESSURE	1						MTU	B	
MAIN CONTROL BLDG	PSL	AERATION LOW AIR PRESSURE	1						MTU	A	
MAIN CONTROL BLDG	MAINT MCC	BLOWER 1 OVERLOAD	1						MCC	A	
MAIN CONTROL BLDG	MAINT MCC	BLOWER 1 STATUS	1						MCC	A	
MAIN CONTROL BLDG	MAINT MCC	BLOWER 1 VFD STATUS % SPEED			1				MCC	B	
MAIN CONTROL BLDG	MAINT MCC	BLOWER 1 VFD STATUS OVERLOAD	1						MCC	B	
MAIN CONTROL BLDG	MAINT MCC	BLOWER 1 VFD STATUS STATUS	1						MCC	B	
MAIN CONTROL BLDG	MAINT MCC	BLOWER 2 OVERLOAD	1						MCC	A	
MAIN CONTROL BLDG	MAINT MCC	BLOWER 2 STATUS	1						MCC	A	
MAIN CONTROL BLDG	MAINT MCC	BLOWER 2 VFD STATUS % SPEED			1				MCC	B	
MAIN CONTROL BLDG	MAINT MCC	BLOWER 2 VFD STATUS OVERLOAD	1						MCC	B	
MAIN CONTROL BLDG	MAINT MCC	BLOWER 2 VFD STATUS STATUS	1						MCC	B	
MAIN CONTROL BLDG	MAINT MCC	BLOWER 3 OVERLOAD	1						MCC	A	
MAIN CONTROL BLDG	MAINT MCC	BLOWER 3 STATUS	1						MCC	A	
MAIN CONTROL BLDG	MAINT MCC	BLOWER 3 VFD STATUS % SPEED			1				MCC	B	
MAIN CONTROL BLDG	MAINT MCC	BLOWER 3 VFD STATUS OVERLOAD	1						MCC	B	
MAIN CONTROL BLDG	MAINT MCC	BLOWER 3 VFD STATUS STATUS	1						MCC	B	
MAIN CONTROL BLDG	MAINT MCC	FUTURE BLOWER 4 VFD STATUS % SPEED			1				MCC	B	
MAIN CONTROL BLDG	MAINT MCC	FUTURE BLOWER 4 VFD STATUS OVERLOAD	1						MCC	A	
MAIN CONTROL BLDG	MAINT MCC	FUTURE BLOWER 4 VFD STATUS STATUS	1						MCC	A	
MAIN CONTROL BLDG	FIT	FUTURE COUNTRY ROOTS FLOW			1				MTU	B	
MAIN CONTROL BLDG	FIT	FUTURE COUNTRY ROOTS FLOW TOTALIZATION	1						MTU	C	
MAIN CONTROL BLDG	FIT	FUTURE INDUSTRIAL PARK FLOW			1				MTU	C	
MAIN CONTROL BLDG	FIT	FUTURE INDUSTRIAL PARK FLOW TOTALIZATION	1						MTU	C	
MAIN CONTROL BLDG	FIT-M03	FUTURE PLANT INFLUENT FLOW BYPASS TO HOLDING			1				MTU	C	
MAIN CONTROL BLDG	FIT-M03	FUTURE PLANT INFLUENT FLOW BYPASS TO HOLDING TOTALIZATION	1						MTU	C	
MAIN CONTROL BLDG	GEN ANNUNC	GENERATOR ALARM	1						MTU	C	1
MAIN CONTROL BLDG	GEN ANNUNC	GENERATOR BATTERY CHARGER MALFUNCTION	1						MTU	A	
MAIN CONTROL BLDG	GEN ANNUNC	GENERATOR EMERGENCY STOP	1						MTU	A	
MAIN CONTROL BLDG	GEN ANNUNC	GENERATOR HIGH WATER TEMPERATURE	1						MTU	A	
MAIN CONTROL BLDG	GEN ANNUNC	GENERATOR LOW FUEL LEVEL	1						MTU	A	
MAIN CONTROL BLDG	GEN ANNUNC	GENERATOR LOW OIL PRESSURE	1						MTU	A	
MAIN CONTROL BLDG	GEN ANNUNC	GENERATOR LOW WATER TEMPERATURE	1						MTU	A	
MAIN CONTROL BLDG	GEN ANNUNC	GENERATOR ON	1						MTU	A	1
MAIN CONTROL BLDG	GEN ANNUNC	GENERATOR ON LOAD	1						MTU	C	
MAIN CONTROL BLDG	GEN ANNUNC	GENERATOR OVERCRANK	1						MTU	A	
MAIN CONTROL BLDG	GEN ANNUNC	GENERATOR OVERSPEED	1						MTU	A	
MAIN CONTROL BLDG	GEN ANNUNC	GENERATOR PRE HIGH WATER TEMPERATURE	1						MTU	A	
MAIN CONTROL BLDG	GEN ANNUNC	GENERATOR PRE LOW OIL PRESSURE	1						MTU	A	
MAIN CONTROL BLDG	GEN ANNUNC	GENERATOR SYSTEM READY	1						MTU	A	
MAIN CONTROL BLDG	TIT-M01	MAIN CONTROL BLDG AMBIENT INSIDE TEMPERATURE			1				MTU	C	
MAIN CONTROL BLDG	ZSC-M01	MAIN CONTROL BLDG DOOR SWITCH 1	1						MTU	C	
MAIN CONTROL BLDG	ZSC-M02	MAIN CONTROL BLDG DOOR SWITCH 2	1						MTU	C	

LOCATION	DEVICE	INSTRUMENT DESCRIPTION	DI	DO	AI	AO	24V	120V	PLC	REV.	NOTES
MAIN CONTROL BLDG	ZSC-M03	MAIN CONTROL BLDG DOOR SWITCH 3	1						MTU	C	
MAIN CONTROL BLDG	ZSC-M04	MAIN CONTROL BLDG DOOR SWITCH 4	1						MTU	C	
MAIN CONTROL BLDG	ZSC-M05	MAIN CONTROL BLDG DOOR SWITCH 5	1						MTU	C	
MAIN CONTROL BLDG	ZSC-M06	MAIN CONTROL BLDG OVERHEAD DOOR SWITCH 6	1						MTU	C	
MAIN CONTROL BLDG	ZSC-M07	MAIN CONTROL BLDG OVERHEAD DOOR SWITCH 7	1						MTU	C	
MAIN CONTROL BLDG	ATS	NORMAL POWER FAIL	1						MTU	C	1
MAIN CONTROL BLDG	ATS	NORMAL POWER IN USE	1						MTU	C	1
MAIN CONTROL BLDG	FIT	PLANT EFFLUENT FLOW			1				MTU	A	
MAIN CONTROL BLDG	FIT-M01	PLANT INFLUENT FLOW DRY WEATHER			1				MTU	C	
MAIN CONTROL BLDG	FIT-M01	PLANT INFLUENT FLOW DRY WEATHER TOTALIZATION	1						MTU	C	
MAIN CONTROL BLDG	FIT-M02	PLANT INFLUENT FLOW WET WEATHER			1				MTU	C	
MAIN CONTROL BLDG	FIT-M02	PLANT INFLUENT FLOW WET WEATHER TOTALIZATION	1						MTU	C	
CHEMICAL FEED BLDG	CHEM MCC	PRIMARY SETTLING 1 OVERLOAD	1						MTU	C	
CHEMICAL FEED BLDG	CHEM MCC	PRIMARY SETTLING 1 STATUS	1						MTU	C	
CHEMICAL FEED BLDG	WSO-102	PRIMARY SETTLING 2 DRIVE OVERTORQUE	1						MTU	C	
CHEMICAL FEED BLDG	CHEM MCC	PRIMARY SETTLING 2 OVERLOAD	1						MTU	C	
CHEMICAL FEED BLDG	CHEM MCC	PRIMARY SETTLING 2 STATUS	1						MTU	C	
MAIN CONTROL BLDG	MAINT MCC	RETURN ACTIVATED SLUDGE VFD 1 FAILED	1						MCC	A	
MAIN CONTROL BLDG	MAINT MCC	RETURN ACTIVATED SLUDGE VFD 1 STATUS	1						MCC	A	
MAIN CONTROL BLDG	MAINT MCC	RETURN ACTIVATED SLUDGE VFD 2 FAILED	1						MCC	A	
MAIN CONTROL BLDG	MAINT MCC	RETURN ACTIVATED SLUDGE VFD 2 STATUS	1						MCC	A	
MAIN CONTROL BLDG	MAINT MCC	SCUM PIT 1 OVERLOAD	1						MCC	A	
MAIN CONTROL BLDG	MAINT MCC	SCUM PIT 1 STATUS	1						MCC	A	
MAIN CONTROL BLDG	MAINT MCC	SCUM PIT 2 OVERLOAD	1						MCC	A	
MAIN CONTROL BLDG	MAINT MCC	SCUM PIT 2 STATUS	1						MCC	A	
MAIN CONTROL BLDG	LSH	SCUM PIT HIGH LEVEL	1						MTU	A	
MAIN CONTROL BLDG	WSO-M01	SECONDARY SETTLING 1 DRIVE OVERTORQUE	1						MCC	C	
MAIN CONTROL BLDG	MAINT MCC	SECONDARY SETTLING 1 OVERLOAD	1						MCC	A	
MAIN CONTROL BLDG	MAINT MCC	SECONDARY SETTLING 1 STATUS	1						MCC	A	
MAIN CONTROL BLDG	WSO-M02	SECONDARY SETTLING 2 DRIVE OVERTORQUE	1						MCC	C	
MAIN CONTROL BLDG	MAINT MCC	SECONDARY SETTLING 2 OVERLOAD	1						MCC	A	
MAIN CONTROL BLDG	MAINT MCC	SECONDARY SETTLING 2 STATUS	1						MCC	A	
MAIN CONTROL BLDG	FIT	SECONDARY SETTLING BASIN 1 RETURN SLUDGE FLOW			1				MTU	A	
MAIN CONTROL BLDG	FIT	SECONDARY SETTLING BASIN 2 RETURN SLUDGE FLOW			1				MTU	A	
MAIN CONTROL BLDG	ATS	STANDBY POWER IN USE	1						MTU	A	1
MAIN CONTROL BLDG	LSH	SUMP HIGH LEVEL	1						MTU	A	
MAIN CONTROL BLDG	FIT	TOTAL RETURN SLUDGE FLOW			1				MTU	A	1
CHEMICAL FEED BLDG	JC-105	3/4HP PRIMARY SETTLING DRIVE AMPS			1				RTU-1	A	
CHEMICAL FEED BLDG	JC-106	3/4HP PRIMARY SETTLING DRIVE AMPS			1				RTU-1	A	
CHEMICAL FEED BLDG	JC-101	3HP BLOWER AMPS			1				RTU-1	A	
CHEMICAL FEED BLDG	JC-102	3HP BLOWER AMPS			1				RTU-1	A	
CHEMICAL FEED BLDG	JC-103	3HP PUMP AMPS			1				RTU-1	A	
CHEMICAL FEED BLDG	JC-104	3HP PUMP AMPS			1				RTU-1	A	
CHEMICAL FEED BLDG	AIT-101	AERATION BASIN DISSOLVED OXYGEN			1				RTU-1	C	
CHEMICAL FEED BLDG	AIT-111	AMMONIA MONITORING ANALOG	1		1				RTU-1	B	
CHEMICAL FEED BLDG	CHEM MCC	BLOWER 1 OVERLOAD	1						RTU-1	A	
CHEMICAL FEED BLDG	CHEM MCC	BLOWER 1 STATUS	1						RTU-1	A	
CHEMICAL FEED BLDG	CHEM MCC	BLOWER 2 OVERLOAD	1						RTU-1	A	
CHEMICAL FEED BLDG	CHEM MCC	BLOWER 2 STATUS	1						RTU-1	A	
CHEMICAL FEED BLDG	TIT-101	CHEMICAL FEED BLDG AMBIENT INSIDE TEMPERATURE			1				RTU-1	C	
CHEMICAL FEED BLDG	ZSC-101	CHEMICAL FEED BLDG DOOR SWITCH 1	1						RTU-1	C	
CHEMICAL FEED BLDG	ZSC-102	CHEMICAL FEED BLDG DOOR SWITCH 2	1						RTU-1	C	

LOCATION	DEVICE	INSTRUMENT DESCRIPTION	DI	DO	AI	AO	24V	120V	PLC	REV.	NOTES
CHEMICAL FEED BLDG	CHEM MCC	CHEMICAL FEEDER 1 OVERLOAD	1						RTU-1	A	
CHEMICAL FEED BLDG	CHEM MCC	CHEMICAL FEEDER 1 STATUS	1						RTU-1	A	
CHEMICAL FEED BLDG	CHEM MCC	CHEMICAL FEEDER 2 OVERLOAD	1						RTU-1	A	
CHEMICAL FEED BLDG	CHEM MCC	CHEMICAL FEEDER 2 STATUS	1						RTU-1	A	
CHEMICAL FEED BLDG	CHEM MCC	CHEMICAL FEEDER 3 OVERLOAD	1						RTU-1	A	
CHEMICAL FEED BLDG	CHEM MCC	CHEMICAL FEEDER 3 STATUS	1						RTU-1	A	
CHEMICAL FEED BLDG	PSH-101	HIGH AIR PRESSURE ALARM	1						RTU-1	B	
CHEMICAL FEED BLDG	PSL	LOW AIR PRESSURE ALARM	1						RTU-1	A	
CHEMICAL FEED BLDG	LSL	LOW CHEMICAL LEVEL	1						RTU-1	C	
CHEMICAL FEED BLDG	LSH	PRIMARY PUMP HIGH PIT LEVEL ALARM	1						RTU-1	A	
CHEMICAL FEED BLDG	WSO-101	PRIMARY SETTLING 1 DRIVE OVERTORQUE	1						RTU-1	C	
CHEMICAL FEED BLDG	CHEM MCC	PRIMARY SLUDGE AND SCUM PUMP 1 OVERLOAD	1						RTU-1	A	
CHEMICAL FEED BLDG	CHEM MCC	PRIMARY SLUDGE AND SCUM PUMP 1 STATUS	1						RTU-1	A	
CHEMICAL FEED BLDG	CHEM MCC	PRIMARY SLUDGE AND SCUM PUMP 2 OVERLOAD	1						RTU-1	A	
CHEMICAL FEED BLDG	CHEM MCC	PRIMARY SLUDGE AND SCUM PUMP 2 STATUS	1						RTU-1	A	
CHLORINE BUILDING	AIT-301	CHLORINATION BASIN DISSOLVED OXYGEN			1				RTU-3	B	
CHLORINE BUILDING	WSO-301	CHLORINATION BASIN DRIVE OVERTORQUE	1						RTU-3	C	
CHLORINE BUILDING	CHLOR MCC	CHLORINATION BASIN OVERLOAD	1						RTU-3	C	
CHLORINE BUILDING	CHLOR MCC	CHLORINATION BASIN PUMP OVERLOAD		1					RTU-3	B	
CHLORINE BUILDING	CHLOR MCC	CHLORINATION BASIN PUMP STATUS		1					RTU-3	B	
CHLORINE BUILDING	CHLOR MCC	CHLORINATION BASIN STATUS	1						RTU-3	C	
CHLORINE BUILDING	TIT-301	CHLORINE BUILDING AMBIENT INSIDE TEMPERATURE			1				RTU-3	C	
CHLORINE BUILDING	ZSC-301	CHLORINE BUILDING DOOR SWITCH 1	1						RTU-3	C	
CHLORINE BUILDING	ZSC-302	CHLORINE BUILDING DOOR SWITCH 2	1						RTU-3	C	
CHLORINE BUILDING	PSL	CHLORINE LOW WATER PRESSURE	1						RTU-3	C	
CHLORINE BUILDING	SAMPLER	EFFLUENT SAMPLER POWER STATUS	1						RTU-3	B	
CHLORINE BUILDING	WIT-301	FUTURE SCALE WEIGHT			1				RTU-3	B	
CHLORINE BUILDING	FIT	PLANT EFFLUENT FLOW			1				RTU-3	A	
CHLORINE BUILDING	CHLOR MCC	VARIABLE PUMP SPEED IN-AUTO		1					RTU-3	B	
PRETREATMENT BLDG	JC-507	1.5HP GRIT BLOWER AMPS			1				RTU-4	A	
PRETREATMENT BLDG	JC-505	1.5HP GRIT SCREW AMPS			1				RTU-4	A	
PRETREATMENT BLDG	JC-501	20HP INFLUENT PUMP AMPS			1				RTU-4	A	
PRETREATMENT BLDG	JC-502	20HP INFLUENT PUMP AMPS			1				RTU-4	A	
TERTIARY FILTER BLDG	JC-405	25HP BACKWASH PUMP AMPS			1				RTU-4	A	
TERTIARY FILTER BLDG	JC-406	25HP BACKWASH PUMP AMPS			1				RTU-4	A	
TERTIARY FILTER BLDG	JC-403	2HP MUDWELL PUMP AMPS			1				RTU-4	A	
TERTIARY FILTER BLDG	JC-404	2HP MUDWELL PUMP AMPS			1				RTU-4	A	
TERTIARY FILTER BLDG	JC-407	3HP FILTER BLOWER AMPS			1				RTU-4	A	
TERTIARY FILTER BLDG	JC-408	3HP FILTER BLOWER AMPS			1				RTU-4	A	
PRETREATMENT BLDG	JC-503	45HP INFLUENT PUMP AMPS			1				RTU-4	A	
PRETREATMENT BLDG	JC-504	45HP INFLUENT PUMP AMPS			1				RTU-4	A	
PRETREATMENT BLDG	JC-506	5HP BAR SCREEN AMPS			1				RTU-4	A	
TERTIARY FILTER BLDG	JC-401	5HP NPW PUMP AMPS			1				RTU-4	A	
TERTIARY FILTER BLDG	JC-402	5HP NPW PUMP AMPS			1				RTU-4	A	
TERTIARY FILTER BLDG	FILT MCC	AIR COMPRESSOR 1 OVERLOAD	1						RTU-4	A	
TERTIARY FILTER BLDG	FILT MCC	AIR COMPRESSOR 1 STATUS	1						RTU-4	A	
TERTIARY FILTER BLDG	FILT MCC	AIR COMPRESSOR 2 OVERLOAD	1						RTU-4	A	
TERTIARY FILTER BLDG	FILT MCC	AIR COMPRESSOR 2 STATUS	1						RTU-4	A	
TERTIARY FILTER BLDG	FILT MCC	BACKWASH PUMP 1 OVERLOAD	1						RTU-4	A	
TERTIARY FILTER BLDG	FILT MCC	BACKWASH PUMP 1 STATUS	1						RTU-4	A	
TERTIARY FILTER BLDG	FILT MCC	BACKWASH PUMP 2 OVERLOAD	1						RTU-4	A	
TERTIARY FILTER BLDG	FILT MCC	BACKWASH PUMP 2 STATUS	1						RTU-4	A	

LOCATION	DEVICE	INSTRUMENT DESCRIPTION	DI	DO	AI	AO	24V	120V	PLC	REV.	NOTES
TERTIARY FILTER BLDG	FILT MCC	BLOWER 1 OVERLOAD	1						RTU-4	A	
TERTIARY FILTER BLDG	FILT MCC	BLOWER 1 STATUS	1						RTU-4	A	
TERTIARY FILTER BLDG	FILT MCC	BLOWER 2 OVERLOAD	1						RTU-4	A	
TERTIARY FILTER BLDG	FILT MCC	BLOWER 2 STATUS	1						RTU-4	A	
TERTIARY FILTER BLDG	LIT-401	CLEARWELL LEVEL SENSOR			1				RTU-4	B	
TERTIARY FILTER BLDG	PSH-401	HIGH AIR PRESSURE ALARM	1						RTU-4	B	
TERTIARY FILTER BLDG	LSH	HIGH LEVEL MUDWELL ALARM	1						RTU-4	A	
TERTIARY FILTER BLDG	LSH	HIGH LEVEL SUMP ALARM	1						RTU-4	A	
TERTIARY FILTER BLDG	PSL	LOW AIR PRESSURE ALARM	1						RTU-4	A	
TERTIARY FILTER BLDG	PSL	LOW WATER PRESSURE ALARM	1						RTU-4	A	
TERTIARY FILTER BLDG	LIT-402	MUDWELL LEVEL SENSOR			1				RTU-4	B	
TERTIARY FILTER BLDG	FILT MCC	MUDWELL PUMP 1 OVERLOAD	1						RTU-4	A	
TERTIARY FILTER BLDG	FILT MCC	MUDWELL PUMP 1 STATUS	1						RTU-4	A	
TERTIARY FILTER BLDG	FILT MCC	MUDWELL PUMP 2 OVERLOAD	1						RTU-4	A	
TERTIARY FILTER BLDG	FILT MCC	MUDWELL PUMP 2 STATUS	1						RTU-4	A	
TERTIARY FILTER BLDG	FILT MCC	SEAL WATER SYSTEM 1 OVERLOAD	1						RTU-4	A	
TERTIARY FILTER BLDG	FILT MCC	SEAL WATER SYSTEM 1 STATUS	1						RTU-4	A	
TERTIARY FILTER BLDG	FILT MCC	SEAL WATER SYSTEM 2 OVERLOAD	1						RTU-4	A	
TERTIARY FILTER BLDG	FILT MCC	SEAL WATER SYSTEM 2 STATUS	1						RTU-4	A	
TERTIARY FILTER BLDG	TIT-401	TERTIARY FILTER BLDG AMBIENT INSIDE TEMPERATURE			1				RTU-4	C	
TERTIARY FILTER BLDG	ZSC-401	TERTIARY FILTER BLDG DOOR SWITCH 1	1						RTU-4	C	
TERTIARY FILTER BLDG	ZSC-402	TERTIARY FILTER BLDG DOOR SWITCH 2	1						RTU-4	C	
TERTIARY FILTER BLDG	ZSC-403	TERTIARY FILTER BLDG OVERHEAD DOOR SWITCH 3	1						RTU-4	C	
PRETREATMENT BLDG	SCREEN PANEL	BAR SCREEN ALARM	1						RTU-5	A	
PRETREATMENT BLDG	SCREEN PANEL	BAR SCREEN STATUS	1						RTU-5	A	
PRETREATMENT BLDG	SCREEN PANEL	BAR SCREEN TORQUE			1				RTU-5	B	
PRETREATMENT BLDG	RTU-5	DRY WEATHER INFLUENT FLOW			1				RTU-5	C	
PRETREATMENT BLDG	RTU-5	DRY WEATHER INFLUENT FLOW TOTALIZATION	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	FUTURE BYPASS TO HOLDING FLOW			1				RTU-5	C	
PRETREATMENT BLDG	RTU-5	FUTURE BYPASS TO HOLDING FLOW TOTALIZATION	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	FUTURE INFLUENT PUMP 5 VFD OVERLOAD	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	FUTURE INFLUENT PUMP 5 VFD SPEED COMMAND				1			RTU-5	C	
PRETREATMENT BLDG	RTU-5	FUTURE INFLUENT PUMP 5 VFD STATUS	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	FUTURE INFLUENT PUMP 6 VFD OVERLOAD	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	FUTURE INFLUENT PUMP 6 VFD SPEED COMMAND				1			RTU-5	C	
PRETREATMENT BLDG	RTU-5	FUTURE INFLUENT PUMP 6 VFD STATUS	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	FUTURE INFLUENT PUMP STATION PUMP 5 INSULATION RESISTANCE TEST							RTU-5	C	2
PRETREATMENT BLDG	RTU-5	FUTURE INFLUENT PUMP STATION PUMP 6 INSULATION RESISTANCE TEST							RTU-5	C	2
PRETREATMENT BLDG	RTU-5	GRIT BLOWER 1 OVERLOAD	1						RTU-5	A	
PRETREATMENT BLDG	RTU-5	GRIT BLOWER 1 STATUS	1						RTU-5	A	
PRETREATMENT BLDG	RTU-5	GRIT BLOWER 2 OVERLOAD	1						RTU-5	A	
PRETREATMENT BLDG	RTU-5	GRIT BLOWER 2 STATUS	1						RTU-5	A	
PRETREATMENT BLDG	GRIT PANEL	GRIT WASH OVERLOAD	1						RTU-5	B	
PRETREATMENT BLDG	GRIT PANEL	GRIT WASH STATUS	1						RTU-5	B	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 1 OVERTEMPERATURE	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 1 SEAL FAIL	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 1 VFD OVERLOAD	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 1 VFD SPEED COMMAND				1			RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 1 VFD STATUS	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 2 OVERTEMPERATURE	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 2 SEAL FAIL	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 2 VFD OVERLOAD	1						RTU-5	C	

LOCATION	DEVICE	INSTRUMENT DESCRIPTION	DI	DO	AI	AO	24V	120V	PLC	REV.	NOTES
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 2 VFD SPEED COMMAND				1			RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 2 VFD STATUS	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 3 OVERTEMPERATURE	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 3 SEAL FAIL	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 3 VFD OVERLOAD	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 3 VFD SPEED COMMAND				1			RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 3 VFD STATUS	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 4 OVERTEMPERATURE	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 4 SEAL FAIL	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 4 VFD OVERLOAD	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 4 VFD SPEED COMMAND				1			RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 4 VFD STATUS	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 5 OVERTEMPERATURE	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 5 SEAL FAIL	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 6 OVERTEMPERATURE	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP 6 SEAL FAIL	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP STATION PUMP 1 INSULATION RESISTANCE TEST							RTU-5	C	2
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP STATION PUMP 2 INSULATION RESISTANCE TEST							RTU-5	C	2
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP STATION PUMP 3 INSULATION RESISTANCE TEST							RTU-5	C	2
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP STATION PUMP 4 INSULATION RESISTANCE TEST							RTU-5	C	2
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP STATION PUMP AMPS							RTU-5	B	2
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP STATION PUMP VOLTS							RTU-5	B	2
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP STATION WETWELL HIGH LEVEL FLOAT (BACKUP ACTIVE)	1						RTU-5	C	
PRETREATMENT BLDG	RTU-5	INFLUENT PUMP STATION WETWELL LEVEL			1				RTU-5	B	
PRETREATMENT BLDG	SAMPLER	INFLUENT SAMPLER POWER STATUS	1						RTU-5	B	
PRETREATMENT BLDG	RTU-5	WET WEATHER INFLUENT FLOW			1				RTU-5	C	
PRETREATMENT BLDG	RTU-5	WET WEATHER INFLUENT FLOW TOTALIZATION	1						RTU-5	C	
AEROBIC DIGESTER	JC-601	5HP TURBINE AIR AMPS			1				RTU-6	A	
AEROBIC DIGESTER	JC-602	5HP TURBINE AIR AMPS			1				RTU-6	A	
AEROBIC DIGESTER	JC-603	5HP TURBINE AIR AMPS			1				RTU-6	A	
AEROBIC DIGESTER	JC-604	5HP TURBINE AIR AMPS			1				RTU-6	A	
AEROBIC DIGESTER	AIT	DISSOLVED OXYGEN			1				RTU-6	A	
AEROBIC DIGESTER	AERDIG MCC	TURBINE AIR MIXER 1 OVERLOAD	1						RTU-6	A	
AEROBIC DIGESTER	AERDIG MCC	TURBINE AIR MIXER 1 STATUS	1						RTU-6	A	
AEROBIC DIGESTER	AERDIG MCC	TURBINE AIR MIXER 2 OVERLOAD	1						RTU-6	A	
AEROBIC DIGESTER	AERDIG MCC	TURBINE AIR MIXER 2 STATUS	1						RTU-6	A	
AEROBIC DIGESTER	AERDIG MCC	TURBINE AIR MIXER 3 OVERLOAD	1						RTU-6	A	
AEROBIC DIGESTER	AERDIG MCC	TURBINE AIR MIXER 3 STATUS	1						RTU-6	A	
AEROBIC DIGESTER	AERDIG MCC	TURBINE AIR MIXER 4 OVERLOAD	1						RTU-6	A	
AEROBIC DIGESTER	AERDIG MCC	TURBINE AIR MIXER 4 STATUS	1						RTU-6	A	
DIGESTER CONTROL BLDG	JC-704	5HP BLOWER AMPS			1				RTU-7	A	
DIGESTER CONTROL BLDG	JC-705	5HP BLOWER AMPS			1				RTU-7	A	
DIGESTER CONTROL BLDG	JC-702	7.5HP SLUDGE PUMP AMPS			1				RTU-7	A	
DIGESTER CONTROL BLDG	JC-703	7.5HP SLUDGE PUMP AMPS			1				RTU-7	A	
DIGESTER CONTROL BLDG	JC-701	7.5HP TURBINE AIR AMPS			1				RTU-7	A	
DIGESTER CONTROL BLDG	ZSO	BED 1 VALVE OPEN	1						RTU-7	A	
DIGESTER CONTROL BLDG	ZSO	BED 2 VALVE OPEN	1						RTU-7	A	
DIGESTER CONTROL BLDG	ZSO	BED 3 VALVE OPEN	1						RTU-7	A	
DIGESTER CONTROL BLDG	ZSO	BED 4 VALVE OPEN	1						RTU-7	A	
DIGESTER CONTROL BLDG	DIG MCC	BLOWER 1 OVERLOAD	1						RTU-7	A	
DIGESTER CONTROL BLDG	DIG MCC	BLOWER 1 STATUS	1						RTU-7	A	
DIGESTER CONTROL BLDG	DIG MCC	BLOWER 2 OVERLOAD	1						RTU-7	A	

LOCATION	DEVICE	INSTRUMENT DESCRIPTION	DI	DO	AI	AO	24V	120V	PLC	REV.	NOTES
DIGESTER CONTROL BLDG	DIG MCC	BLOWER 2 STATUS	1						RTU-7	A	
DIGESTER CONTROL BLDG	AIT	DISSOLVED OXYGEN			1				RTU-7	A	
DIGESTER CONTROL BLDG	PSL	LOW AIR PRESSURE ALARM	1						RTU-7	A	
DIGESTER CONTROL BLDG	RTU-7	POLYMER LOW LEVEL		1					RTU-7	A	
DIGESTER CONTROL BLDG	RTU-7	POLYMER PUMP FAIL		1					RTU-7	A	
DIGESTER CONTROL BLDG	RTU-7	POLYMER PUMP REQUIRED		1					RTU-7	A	
DIGESTER CONTROL BLDG	RTU-7	POLYMER PUMP RUN		1					RTU-7	A	
DIGESTER CONTROL BLDG	RTU-7	POLYMER PUMP START CMD		1					RTU-7	A	
DIGESTER CONTROL BLDG	RTU-7	POLYMER PUMP STOP CMD		1					RTU-7	A	
DIGESTER CONTROL BLDG	ZSH	SLUDGE BED 1 FULL	1						RTU-7	A	
DIGESTER CONTROL BLDG	ZSH	SLUDGE BED 2 FULL	1						RTU-7	A	
DIGESTER CONTROL BLDG	ZSH	SLUDGE BED 3 FULL	1						RTU-7	A	
DIGESTER CONTROL BLDG	ZSH	SLUDGE BED 4 FULL	1						RTU-7	A	
DIGESTER CONTROL BLDG	FIT	SLUDGE FLOW			1				RTU-7	A	
DIGESTER CONTROL BLDG	RTU-7	SLUDGE PUMP 1 IN-AUTO	1						RTU-7	C	
DIGESTER CONTROL BLDG	DIG MCC	SLUDGE PUMP 1 OVERLOAD	1						RTU-7	A	
DIGESTER CONTROL BLDG	RTU-7	SLUDGE PUMP 1 REQUIRED	1						RTU-7	A	
DIGESTER CONTROL BLDG	RTU-7	SLUDGE PUMP 1 START CMD		1					RTU-7	A	
DIGESTER CONTROL BLDG	DIG MCC	SLUDGE PUMP 1 STATUS	1						RTU-7	A	
DIGESTER CONTROL BLDG	RTU-7	SLUDGE PUMP 1 STOP CMD		1					RTU-7	A	
DIGESTER CONTROL BLDG	RTU-7	SLUDGE PUMP 2 IN-AUTO	1						RTU-7	C	
DIGESTER CONTROL BLDG	DIG MCC	SLUDGE PUMP 2 OVERLOAD	1						RTU-7	A	
DIGESTER CONTROL BLDG	RTU-7	SLUDGE PUMP 2 REQUIRED	1						RTU-7	A	
DIGESTER CONTROL BLDG	RTU-7	SLUDGE PUMP 2 START CMD		1					RTU-7	A	
DIGESTER CONTROL BLDG	DIG MCC	SLUDGE PUMP 2 STATUS	1						RTU-7	A	
DIGESTER CONTROL BLDG	RTU-7	SLUDGE PUMP 2 STOP CMD		1					RTU-7	A	
DIGESTER CONTROL BLDG	DIG MCC	TURBINE AIR MIXER OVERLOAD	1						RTU-7	A	
DIGESTER CONTROL BLDG	DIG MCC	TURBINE AIR MIXER STATUS	1						RTU-7	A	
EAST LIFT STATION	TIT-801	EAST LIFT STATION BLDG AMBIENT INSIDE TEMPERATURE			1				RTU-8	C	
EAST LIFT STATION	ZSC-801	EAST LIFT STATION BLDG DOOR SWITCH 1	1						RTU-8	C	
EAST LIFT STATION	FIT	EAST LIFT STATION EFFLUENT FLOW			1				RTU-8	C	
EAST LIFT STATION	LSH	EAST LIFT STATION HIGH LEVEL FLOAT (BACKUP ACTIVE)	1						RTU-8	B	
EAST LIFT STATION	RTU-8	EAST LIFT STATION PANEL INTRUSION	1						RTU-8	C	
EAST LIFT STATION	RTU-8	EAST LIFT STATION PUMP 1 INSULATION RESISTANCE TEST							RTU-8	C	2
EAST LIFT STATION	RTU-8	EAST LIFT STATION PUMP 2 INSULATION RESISTANCE TEST							RTU-8	C	2
EAST LIFT STATION	RTU-8	EAST LIFT STATION PUMP AMPS							RTU-8	C	2
EAST LIFT STATION	RTU-8	EAST LIFT STATION PUMP VOLTS							RTU-8	C	2
EAST LIFT STATION	FIT	FUTURE EAST LAGOON INFLUENT FLUME			1				RTU-8	C	
EAST LIFT STATION	RTU-8	PUMP 1 OVERTEMP	1						RTU-8	C	
EAST LIFT STATION	RTU-8	PUMP 1 SEAL FAIL	1						RTU-8	C	
EAST LIFT STATION	RTU-8	PUMP 1 VFD OVERLOAD	1						RTU-8	B	
EAST LIFT STATION	RTU-8	PUMP 1 VFD SPEED COMMAND				1			RTU-8	B	
EAST LIFT STATION	RTU-8	PUMP 1 VFD STATUS	1						RTU-8	C	
EAST LIFT STATION	RTU-8	PUMP 2 OVERTEMP	1						RTU-8	C	
EAST LIFT STATION	RTU-8	PUMP 2 SEAL FAIL	1						RTU-8	C	
EAST LIFT STATION	RTU-8	PUMP 2 VFD OVERLOAD	1						RTU-8	B	
EAST LIFT STATION	RTU-8	PUMP 2 VFD SPEED COMMAND				1			RTU-8	C	
EAST LIFT STATION	RTU-8	PUMP 2 VFD STATUS	1						RTU-8	B	
EAST LIFT STATION	LIT	WETWELL LEVEL			1				RTU-8	B	
SOUTH LIFT STATION	FIT	FUTURE SOUTH LAGOON INFLUENT FLUME			1				RTU-9	C	
SOUTH LIFT STATION	RTU-9	PUMP 1 OVERTEMP	1						RTU-9	C	
SOUTH LIFT STATION	RTU-9	PUMP 1 SEAL FAIL	1						RTU-9	C	

LOCATION	DEVICE	INSTRUMENT DESCRIPTION	DI	DO	AI	AO	24V	120V	PLC	REV.	NOTES
SOUTH LIFT STATION	RTU-9	PUMP 1 VFD OVERLOAD	1						RTU-9	B	
SOUTH LIFT STATION	RTU-9	PUMP 1 VFD SPEED COMMAND				1			RTU-9	B	
SOUTH LIFT STATION	RTU-9	PUMP 1 VFD STATUS	1						RTU-9	C	
SOUTH LIFT STATION	RTU-9	PUMP 2 OVERTEMP	1						RTU-9	C	
SOUTH LIFT STATION	RTU-9	PUMP 2 SEAL FAIL	1						RTU-9	C	
SOUTH LIFT STATION	RTU-9	PUMP 2 VFD OVERLOAD	1						RTU-9	B	
SOUTH LIFT STATION	RTU-9	PUMP 2 VFD SPEED COMMAND				1			RTU-9	C	
SOUTH LIFT STATION	RTU-9	PUMP 2 VFD STATUS	1						RTU-9	B	
SOUTH LIFT STATION	TIT-901	SOUTH LIFT STATION BLDG AMBIENT INSIDE TEMPERATURE			1				RTU-9	C	
SOUTH LIFT STATION	ZSC-901	SOUTH LIFT STATION BLDG DOOR SWITCH 1	1						RTU-9	C	
SOUTH LIFT STATION	FIT	SOUTH LIFT STATION EFFLUENT FLOW			1				RTU-9	C	
SOUTH LIFT STATION	LSH	SOUTH LIFT STATION HIGH LEVEL FLOAT (BACKUP ACTIVE)	1						RTU-9	B	
SOUTH LIFT STATION	RTU-9	SOUTH LIFT STATION PANEL INTRUSION	1						RTU-9	C	
SOUTH LIFT STATION	RTU-9	SOUTH LIFT STATION PUMP 1 INSULATION RESISTANCE TEST							RTU-9	C	2
SOUTH LIFT STATION	RTU-9	SOUTH LIFT STATION PUMP 2 INSULATION RESISTANCE TEST							RTU-9	C	2
SOUTH LIFT STATION	RTU-9	SOUTH LIFT STATION PUMP AMPS							RTU-9	C	2
SOUTH LIFT STATION	RTU-9	SOUTH LIFT STATION PUMP VOLTS							RTU-9	C	2
SOUTH LIFT STATION	LIT	WETWELL LEVEL			1				RTU-9	B	
		TOTALS	213	13	79	10	0	0			

NOTES:

1. Activates WIN-911 Dialer
2. Pump Voltage and Amperage monitored by dedicated inputs on the MultiSmart Controller.

DIVISION 13

SECTION 13940 – SUPERVISORY CONTROL SYSTEM

1.00 GENERAL

1.01 SUMMARY

A. This Section includes requirements for plant operation and for system integration of equipment, controls, PLCs, and instrumentation.

PLCs provided and programmed by either the equipment manufacturers and included in the manufacturer's control panel or provided and programmed by the System Integrator and included in the distributed RTU and MTU panels will provide control for individual pieces of equipment or process areas. These PLCs shall be linked via a radio and hardwired network using Ethernet protocol to provide data exchange and remote monitoring and control of equipment as outlined herein. Details of the network are illustrated on the General SCADA Layout Plan.

The Systems Integrator shall be responsible for the complete integration of the plant systems as shown on the General SCADA Layout Plan, resulting in central monitoring of the Plant and remote lift stations from the operator workstation located in the lab (MTU). The plant control system shall include the plant network and connection to the plant's remote lift stations.

Work under this Section includes:

1. Furnish and install a desktop computer that shall serve as the Operator Interface. This includes installing all software, configuring database input and output, installing and debugging programs, installing and testing all peripheral equipment, installing and configuring a printer, and testing for proper operation.
2. Integrate inputs and outputs with the process equipment manufacturer provided PLCs and field controls with the Operator Interfaces to ensure complete and proper communications to allow for centralized plant monitoring, control, data logging, and alarm processing from the Operator Interface. It is the responsibility of the Systems Integrator to review subsystem adherence to the I/O List, specifications and to test and confirm proper communications between the various system components as well as proper systems operation. The Systems Integrator shall also be responsible to update and communicate Integrator I/O List changes to the subsystem providers.
3. Furnish, install, and program six (6) RTUs (RTU-1, RTU-3, RTU-4, RTU-5, RTU-6, RTU-7) for gathering distributed plant I/O. These new RTU's will replace existing RTUs that gather I/O for the existing Aquatrol system.
4. Furnish, install, and program one (1) MTU. The MTU will replace the centrally located lab Aquatrol panel which receives and processes signals from smaller control systems throughout the plant and provides supervisory monitoring, a single source for SCADA displayed and trended data, and overall system flow calculations for use by the subsystems. The MTU also provides control and shall meet the specifications as detailed in Specification Section 13920.
5. Furnish and install a UPS for the Server Workstation.
6. Develop data archiving (includes programming for automatic download of monitored plant data to CSV files).
7. Furnish and configure software for SCADA system remote alarming.
8. Develop control screens graphics and install on the Operator Interface.
9. Provide all necessary software with documentation (and licenses as required) to maintain, modify, and/or update the system.
10. Furnish, install, and program all Ethernet switches and related networking equipment as detailed and/or necessary to accomplish the network architecture as shown on the General SCADA Layout Plan.
11. Generate and maintain, throughout the project, the Systems Integrator Tag List and communicate the list to all equipment providers and their programmers. Review all equipment providers' PLC programs for adherence to the System Integrator's Tag List.

B. Related Sections: The following Sections contain requirements that relate to this Section and Related Sections:

1. 11322 – Automatic Coarse Bar Screen
2. 11322 – Inclined Grit Screw
3. 11850 – Influent Lift Station Rehabilitation
4. 13443 – MCC
5. 13900 – SCADA System

1.02 REFERENCES

A. National Fire Protection Association (NFPA): NFPA 70 -National Electric Code® (NEC).

1.03 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.

B. Product Data: Drawings and documentation from manufacturer detailing hardware and software.

C. Control Narrative: A tablular document detailing the control system function including equipment monitoring, control, alarming and the system configuration.

D. Graphic Control Screens at 50% completion.

2.00 PRODUCTS

2.01 SERVER WORKSTATION

A. Minimum System Requirements for Server Workstation Desktop Unit:

1. PROCESSOR: Intel™ Core i7
2. OPERATING SYSTEM: Windows 7 Professional
3. MEMORY: 8GB
4. HARD DRIVE(s): 500Gb Solid State Boot Drive, 500Gb SATA Internal Back-up, RAID
5. VIDEO CARD: Dual Monitor DVI / HDMI
6. CHASSIS CONFIGURATION: Desktop Tower Chassis Configuration
7. OPTICAL DRIVE: 16X DVD-R/W
8. NETWORK ADAPTER: 10/100/1000 Ethernet LAN card.
9. USB: 4 Ports
10. Laser cordless Mouse and 101-key keyboard.
11. Minimum of two expansion slots.
12. Microsoft Office Suite

2.02 NETWORK STORAGE DEVICE

A. 3TB. Ethernet Connected

2.03 MONITOR

A. One (1) 24-inch widescreen flat panel LCD monitor with height adjustable stand. Resolution shall be 1920 x1200 or better.

2.04 OVERVIEW DISPLAY

A. One (1) 60 inch widescreen LED backlit, flat panel LCD monitor wall-mounted. Native resolution shall be 1920 x1080 or better, and monitors shall be VGA, and HDMI capable.

2.05 PRINTER

A. One (1) Ethernet-ready laser printers for graphics and report generation. Laser printers shall be HP LaserJet. Include necessary connection cables.

2.06 UNINTERRUPTIBLE POWER SUPPLY

A. Provide, install, and program, as necessary, one (1) desk/floor mounted UPS for the desktop Server Workstation. UPSs shall be manufactured by Liebert or equal.

a. UPSs shall be on-line topology capable of providing at least 15 minutes of continuous and simultaneous operation of all connected equipment.
b. UPS monitoring software shall communicate with the computer system it is protecting to provide notification and shutdown capabilities. UPSs shall also communicate its status to the MTU in order to capture the event in the control system and provide alarming.
c. Installation/configuration of the software and necessary cabling along with testing of operation, notification and power supply duration are the responsibility of the Systems Integrator.
d. The MTU shall be powered from the same UPS as the Server Workstation.

2.07 SOFTWARE

A. General: The software used shall be commercially available with the benefit of numerous independent systems integrators having expertise in the use and programming of the software.

B. HMI (SCADA) Software: HMI/SCADA system that features full process visualization, data collection and management, and supervisory control. HMI software shall include necessary drivers and configuration utilities. HMI software shall be the latest version of Indusoft Web Studio. One user access license is required for the Server Workstation. Licensing shall be provided for monitor and control capabilities on the Desktop Computers.

C. WIN-911/PRO-BDX alarm software package shall be included to provide alarm management and alert via analog telephone connection, e-mail, paging, and SMS.

D. PLC Programming Software: Rockwell Automation software shall be RSLogix 5000, version 18 (or later). A license (or install) is required for each computer where programming is required.

E. Communication driver(s): Communications driver shall be provided for the Server Workstation where communication is necessary to achieve seamless communication between the SCADA system and the PLC and UPS devices. RSLinx Classic shall be used wherever possible.

3.00 EXECUTION

3.01 GENERAL

A. The descriptions provided in this Section, together with the other applicable Sections and the Contract Drawings comprise the functional design criteria for the existing and new equipment modified under this Project.

B. The existing Aquatrol SCADA system shall be duplicated by the new equipment with respect to monitoring and control.

C. Discrete status changes shall be logged in the plant database. Alarms shall be logged and annunciated on the Server Workstation display. Acknowledgment of the alarm shall also be logged.

3.02 CONTROL TABLE

The controllers (PLCs) in this system are provided and programmed by the manufacturer of the individual equipment item or functional group of equipment items, or are provided and programmed by the Systems Integrator. Descriptions of the control functions associated with controllers (PLCs) provided by equipment manufacturers are provided in the individual equipment specifications and herein. The Systems Integrator must coordinate with the equipment manufacturers to obtain the necessary programming documentation and I/O lists with PLC addresses from these suppliers in order to fully integrate the various functions with the plant SCADA system. The Systems Integrator is responsible for programming the control functions, PID loops, control logic for the RTU and MTU controllers according to the detailed control descriptions below.

Aeration Blowers **MTU**	**Manual:** Blower shall start and stop based on a manual command (either hardwired switch or local interface) and a manual speed set point; **Auto:** Under Review – possibly will use DO control to stage and turndown. **Alarms:** High pressure, low pressure, VFD overload, blower overload **Monitoring:** Blower status, VFD status, VFD speed, DO, alarms
Secondary Scum Pumps **MTU**	**Manual:** Pump shall start and stop based on a manual command (either hardwired switch or local interface); **Auto:** Pump shall run based on adjustable "On" and "Off" time intervals or if a "High Level" is detected; primary pump shall be operator selectable (pump 1, pump 2 or alternate); secondary pump shall start if a pump is required and the primary fails for any reason **Alarms:** Pump overload, high level **Monitoring:** Pump status, alarms
Return Sludge Pumps **MTU**	**Manual:** Pump shall start and stop based on a manual command (either hardwired switch or local interface) and a manual speed set point; **Auto:** Pump shall run based on adjustable "On" and "Off" time intervals; pump shall maintain flow at an adjustable flow set point while running; **Alarms:** Low flow, VFD overload **Monitoring:** VFD status, VFD speed, sludge flow, alarms
Secondary Clarifier Rotating Arm **MTU**	**Manual:** Arm shall start and stop based on a manual command (either hardwired switch or local interface); **Auto:** N/A **Alarms:** Arm overload, overtorque **Monitoring:** Arm status, alarms

Generator **MTU**	**Manual**: Generator shall start and stop based on manual command (either hardwired switch or local interface); **Auto**: Generator shall start and stop based on ATS position and its internal time delays. **Alarms:** Battery Charger Malfunction, Emergency Stop, Low Fuel Level, Low Oil Pressure, Low Water Temperature, Overcrank, Overspeed, High Water Temperature, Pre High Water Temperature, Pre Low Oil Pressure, Alarm, On **Monitoring:** Ready, On Load
Primary Clarifier Rotating Arm **RTU-1**	**Manual:** Arm shall start and stop based on a manual command (either hardwired switch or local interface); **Auto:** N/A **Alarms:** Arm overload, overtorque **Monitoring:** Arm status, alarms
Primary Sludge and Scum Pumps **RTU-1**	**Manual:** Pump shall start and stop based on a manual command (either hardwired switch or local interface); **Auto:** Pump shall run based on adjustable "On" and "Off" time intervals; primary pump shall be operator selectable (pump 1, pump 2 or alternate); secondary pump shall start if a pump is required and the primary fails for any reason **Alarms:** Pump overload, seal fail, high level **Monitoring:** Pump status, alarms
Pre-Aeration Blowers **RTU-1**	**Manual:** Blower shall start and stop based on a manual command (either hardwired switch or local interface); **Auto:** Blower shall maintain air flow to the pre-aeration channel at all times; primary blower shall be operator selectable (blower 1, blower 2 or alternate); alternation shall be based on an adjustable run interval; secondary blower shall start if the primary fails for any reason **Alarms:** Blower overload, high pressure, low pressure **Monitoring:** Blower status, alarms
Chemical Feed Pumps **RTU-1**	**Manual:** Pump shall start and stop based on a manual command (either hardwired switch or local interface); **Auto:** **Alarms:** Pump overload

	Monitoring: Pump status, ammonia concentration, dissolved oxygen concentration, voltage, current, alarms
Chlorine Pump **RTU-3**	**Manual:** Pump shall start and stop based on a manual command (either hardwired switch or local interface) and a manual speed set point; **Auto:** Pump shall start and stop and speed shall modulate to maintain a consistent chlorine concentration; **Alarms:** Pump fail, low water pressure **Monitoring:** Pump status, alarms
Chlorination Basin **RTU-3**	**Manual:** Arm shall start and stop based on a manual command (either hardwired switch or local interface); **Auto:** N/A **Alarms:** Arm overload, overtorque **Monitoring:** Arm status, scale weight, dissolved oxygen concentration, effluent flow, alarms
Tertiary Filter Backwash Pumps **RTU-4**	**Manual:** Pump shall start and stop based on a manual command (either hardwired switch or local interface); **Auto:** Pump shall start as part of the filter backwash cycle; following an adjustable delay after the sludge feed to a filter has stopped, the backwash pump shall run for an adjustable period of time to remove particulate clogging the filter media; primary pump shall be operator selectable (pump 1, pump 2 or alternate); secondary pump shall start if a pump is required and the primary fails for any reason **Alarms:** Pump overload **Monitoring:** Pump status, clearwell level, alarms
Tertiary Filter Mudwell Pumps **RTU-4**	**Manual:** Pump shall start and stop based on a manual command (either hardwired switch or local interface); **Auto:** Pump shall start based on an adjustable "on" level set point and shall run until the level reaches the adjustable "off" level set point; primary pump shall be operator selectable (pump 1, pump 2 or alternate); secondary pump shall start if a pump is required and the primary fails for any reason **Alarms:** High level **Monitoring:** Pump status, mudwell level, alarms

Tertiary Filter Blowers **RTU-4**	**Manual:** Blower shall start and stop based on a manual command (either hardwired switch or local interface); **Auto:** Blower shall start as part of the filter backwash cycle; following an adjustable delay after the backwash pump has started, the blower shall run for an adjustable period of time to help separate particulate from the filter media; primary blower shall be operator selectable (blower 1, blower 2 or alternate); secondary blower shall start if a blower is required and the primary fails for any reason **Alarms:** Blower overload, low pressure, high pressure **Monitoring:** Blower status, alarms
Non-Potable Water Pumps **RTU-4**	**Manual:** Pump shall start and stop based on a manual command (either hardwired switch or local interface); **Auto:** Pump shall run to maintain an adjustable *pressure set point; pump shall stop after running above the set point for an adjustable period of time; primary pump shall be operator selectable (pump 1, pump 2 or alternate); secondary pump shall start if a pump is required and the primary fails for any reason **Alarms:** Pump overload, low pressure **Monitoring:** Pump status, alarms
Tertiary Filter Air Compressors **RTU-4**	**Manual:** Compressor shall start and stop based on a manual command (either hardwired switch or local interface); **Auto:** **Alarms:** Compressor overload **Monitoring:** Compressor status, alarms
Influent Pumps **RTU-5**	**Manual**: Pump shall start and stop based on a manual command (either hardwired switch or local interface) and a manual speed set point; **Auto**: Normally run and alternate dry weather pumps; if both dry weather pumps are unable to keep up with influent flow, determined by adjustable level set points, both pumps shall stop and a wet weather pump shall start; if a wet weather pump is running at maximum for an adjustable period of time and is unable to keep up with the influent flow, determined by adjustable level set points, the dry weather pumps shall start sequentially, based on adjustable level set points, to provide additional flow; if one wet weather pump and both dry weather pumps are unable to

	keep up with the influent flow, determined by adjustable level set points, the dry weather pumps shall stop and the second wet weather pump shall start; the dry weather pumps shall be started and stopped in the same fashion to provide additional flow as needed; pumps shall alternate in a First-On-First-Off configuration; if a pump is not available for any reason the next pump in the sequence shall start automatically; speed shall be proportional to the wet well level (i.e. as the wet well level rises the pump speed will increase and vice versa for falling wet well level); should the pump controller sense a failure of the primary submersible level transducer, the pump control panel will control the pumps in automatic mode using the redundant level sensing probe; should the wet well level reach a predetermined level above the normal operating range of the primary pump controller, the back-up level control system will engage and initiate a high level alarm and call for the lead pump to run at a predetermined user selectable fixed speed. **Alarms:** VFD overload, seal fail, overtemp fail, high level (backup active), low level (HMI generated) **Monitoring:** Pump status, VFD speed, wet well level, voltage, current, dry weather flow and flow total, wet weather flow and flow total, bypass to holding flow and flow total, alarms
Bar Screen Auger **RTU-5**	**Manual:** Auger will start/stop based on manual command (either hardwired switch or through local interface); **Auto:** Auger shall run based on an adjustable time interval or upon detection of a high level upstream of the screen; auger shall run for an adjustable time interval after which the cycle will reset; **Alarms:** Auger overload, high level **Monitoring:** Auger status, ETM, voltage, current, torque, alarms
Grit Blowers **RTU-5**	**Manual:** Blower will start/stop based on manual command (either hardwired input or through local operator interface); **Auto:** Blower configuration will be one primary and one backup; primary blower will run when the pressure is normal (not high/not low); primary blower shall be operator selectable (blower 1, blower 2 or alternate); when alternation is selected, blowers shall alternate using an operator adjustable timed interval; secondary blower shall automatically start if the primary blower becomes unavailable for any reason;

	Alarms: Blower overload, high pressure, low pressure **Monitoring:** Blower status, alarms
Grit Auger **RTU-5**	**Manual:** Auger will start/stop based on manual command (either hardwired switch or through local interface); **Auto:** Auger shall run when a grit blower is running, following an operator adjustable delay; auger shall stop when both blowers stop, following an operator adjustable delay; **Alarms:** Auger overload **Monitoring:** Auger status, ETM, voltage, current, alarms
Aerobic Digester Turbine Air Mixers **RTU-6**	**Manual:** Mixer shall start and stop based on a manual command (either hardwired switch or local interface); **Auto:** N/A **Alarms:** Mixer overload **Monitoring:** Mixer status, dissolved oxygen concentration, alarms
Digester Sludge Pumps **RTU-7**	**Manual:** Pump shall start and stop based on a manual command (either hardwired switch or local interface); **Auto:** Pump shall start, following an adjustable delay, after receiving a "Pump Required" signal; Pump shall stop, following an adjustable delay, after the "Pump Required" signal has been removed; each pump will have its own "Pump Required" signal; Low flow setpoint from HMI will be compared to sludge flow meter flow and will trip pump on "cutout" and require a pushbutton reset. **Alarms:** Pump overload, low flow, pump cutout **Monitoring:** Pump status, return sludge flow, alarms
Polymer Pump **RTU-7**	**Manual:** Pump shall start and stop based on a manual command (either hardwired switch or local interface); **Auto:** Pump shall run following an adjustable delay after receiving a "Pump Required" signal; pump shall stop following an adjustable delay after losing the "Pump Required" signal; **Alarms:** Pump fail, low polymer level **Monitoring:** Pump status, alarms

Existing Digester Blowers **RTU-7**	**Manual:** Blower shall start and stop based on a manual command (either hardwired switch or local interface); **Auto:** Primary blower shall run when no digester sludge pumps are required to run; primary blower shall be operator selectable (blower 1, blower 2 or alternate); secondary blower shall start if the primary fails for any reason **Alarms:** Blower overload, low pressure **Monitoring:** Pump status, dissolved oxygen concentration, alarms
Existing Digester Air Mixer **RTU-7**	**Manual:** Mixer shall start and stop based on a manual command (either hardwired switch or local interface); **Auto:** Mixer shall run when a digester sludge pump is required to run and both digester blowers are off; mixer shall stop when no digester sludge pumps are required; **Alarms:** Mixer overload **Monitoring:** Mixer status, alarms
Vacuum Sludge Drying Bed Valves **RTU-7**	**Manual:** Valve shall open and close based on a manual command (either hardwired switch or local interface); **Auto:** Only one valve will be considered "active" at any time; active valve shall open when a digester sludge pump runs and shall close when no sludge pumps are running, following a short delay; when the bed for the active valve becomes full, valve shall close and the active valve shall alternate; **Alarms:** Sludge bed full **Monitoring:** Valve status, alarms
East Lift Station **RTU-8**	**Manual**: Pumps shall start and stop based on a manual command (either hardwired switch or local interface) with speed set manually. **Auto**: Normally run and alternate pumps; if one pump is unable to keep up with flow, determined by adjustable level set points, both pumps shall start. if a pump is not available for any reason the next pump in the sequence shall start automatically; when influent plant flow goes above 2.5 MGD, the pumps will be commanded to go into holding mode until reaching XX' to accommodate flow equalization. **Alarms:** Pump VFD overload, seal fail, overtemp fail, high level

	Monitoring: Pump status, VFD status, VFD in-bypass, VFD speed, wet well level, voltage, current, flow, alarms
South Lift Station **RTU-9**	**Manual**: Pumps shall start and stop based on a manual command (either hardwired switch or local interface) with speed set manually. **Auto**: Normally run and alternate pumps; if one pump is unable to keep up with flow, determined by adjustable level set points, both pumps shall start. if a pump is not available for any reason the next pump in the sequence shall start automatically; when influent plant flow goes above 2.5 MGD, the pumps will be commanded to go into holding mode until reaching XX' to accommodate flow equalization. **Alarms:** Pump VFD overload, seal fail, overtemp fail, high level **Monitoring:** Pump status, VFD status, VFD in-bypass, VFD speed, wet well level, voltage, current, flow, alarms
Sampling **Various**	**Influent Sampler (RTU-5):** Power Alarm **Effluent Sampler (RTU-3):** Power Alarm
TSS/BOD/Ammonia **N/A**	**Manual:** Manual composite samplers. **Auto:** N/A **Interlocks:** N/A
Building Monitoring **Various**	**Laboratory (MTU):** Ambient Indoor Temp, Five Door Switches, Two Overhead Door Switches **Chemical Feed Building (RTU-1):** Ambient Indoor Temp, Two Door Switches **Chlorine Building (RTU-3):** Ambient Indoor Temp, Two Door Switches **Tertiary Filter Building (RTU-4):** Ambient Indoor Temp, Two Door Switches, One Overhead Door Switch **Pretreatment Building (RTU-5)** **Aerobic Digester** **Digester Control Building** **East Lift Station (RTU-8):** Ambient Indoor Temp, One Door Switch **South Lift Station (RTU-9):** Ambient Indoor Temp, One Door Switch

COM STATUS **Various**	The Server Workstation shall monitor the health of the COM Status to the MTU and each RTU on-site and remote and generate a pop-up alarm for any loss of communication.
ETM **Various**	Every motor "running" contact monitored shall be included in a maintenance table with settable alarms (adjustable to be set based on vendor requirements) for preventative maintenance tracking including last date serviced record.

END OF SECTION 13940

DIVISION 16 – ELECTRICAL

SECTION 16010 - BASIC ELECTRICAL REQUIREMENTS

1.00 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 16.

B. Related Sections: The following Division 16 sections contain requirements that relate to this section:

1. "Basic Electrical Materials and Methods," for materials and methods common to the remainder of Division 16.

1.02 SUMMARY

A. This Section includes general administrative and procedural requirements for electrical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 1:

1. Submittals.
2. Record documents.
3. Maintenance manuals.
4. Rough-ins.
5. Electrical installations.
6. Substitutions.
7. Utility service connections.

1.03 QUALITY ASSURANCE

A. National Electrical Code Compliance: Components and installation shall comply with NFPA 70 "National Electrical Code."

B. UL Compliance: Comply with applicable UL standards pertaining to specific types of electrical materials and components. Provide such that are UL-listed and labeled where applicable.

C. NEMA Compliance: Comply with applicable NEMA standards pertaining to specific types of electrical materials and components.

1.04 SUBMITTALS

A. General: Follow the procedures specified in Division 1 Section "Submittals."

B. Increase the number of electrical related shop drawings, product data, and samples submitted, to allow for required distribution plus one copy of each submittal required, which will be retained by the Electrical Consulting Engineer.

C. Additional copies may be required by individual sections of these Specifications.

1.05 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Division 1 Section "Project Closeout." In addition to the requirements specified in Division 1, indicate installed conditions for:

1. Major raceway systems, size and location, for both exterior and interior; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements.
2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
3. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

1.06 OPERATION AND MAINTENANCE MANUALS

A. Prepare three (3) bound Operation and Maintenance Manuals in accordance with Division 1 Section "Project Closeout." In addition to the requirements specified in Division 1, include the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, complete nomenclature and commercial numbers of replacement parts, and complete parts listing with part name and number.
2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.
5. Reviewed shop drawings and submittals.
6. Record of spare parts provided to Owner with a signature of receipt by Owner's representative.

2.00 PRODUCTS

2.01 GENERAL

A. All equipment and material provided shall be "lead paint free" and asbestos free.

3.00 EXECUTION

3.01 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

B. Refer to equipment specifications in Divisions 2 through 16 for rough-in requirements.

3.02 ELECTRICAL INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements:

1. Coordinate electrical systems, equipment, and materials installation with other building components.
2. Verify all dimensions by field measurements.
3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.
4. 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.

5. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
7. Install systems, materials, and equipment to conform with reviewed submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer.
8. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
9. Install electrical equipment to facilitate servicing, 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.
10. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
11. Install electrical equipment in order to maintain required clearances. Where space limitations mandate that equipment (i.e. water piping) may contribute moisture within these clearances, provide non-combustible shielding to protect electrical equipment from moisture.

3.03 ELECTRICAL CONNECTIONS TO MECHANICAL EQUIPMENT

A. Electrical: Conform to applicable requirements in Division 16 Sections.

B. Grounding: Ground equipment. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque tightening valves. Where manufacturer's torque valves are not indicated, use those specified in UL 486A and UL 486B.

C. Obtain all mechanical equipment control wiring diagrams from mechanical contractor so as to allow installation of field-installed control wiring in conduit between any mechanical equipment and accessories.

D. Provide all power connections to mechanical equipment as indicated on drawings or outlined in Division 16 Sections.

3.04 SUBSTITUTIONS

A. General: All changes and additional work required by this Contractor, or any other contractor, because of a substitution of an equivalent piece of equipment by this Contractor, shall be the responsibility of this Contractor. Substitutions will only be considered when the quality of the product is maintained and it is advantageous to the Owner to consider.

B. Requests for approval to bid equipment by a manufacturer not listed in these specifications must be received by Engineer, in written form, a minimum of ten (10) calendar days prior to bid date.

3.05 UTILITY SERVICE CONNECTIONS

The 277/480-Volt, 3-phase, 4-wire electrical service for this project is existing. The Contractor shall coordinate the shut-down of the electrical service with Ameren to facilitate the replacement of the existing motor control center (MCC).

3.06 CLEANING

A. All equipment and installed materials shall be cleaned inside and outside. All construction dust and loose materials shall be removed. Any printed information attached to the equipment shall be removed and

included in the Operation and Maintenance Manuals. Equipment nameplates shall NOT be removed. Any scratched paint surfaces shall be repaired with manufacturer's touch-up paint.

END OF SECTION 16010

DIVISION 16 – ELECTRICAL

SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS

1.00 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 this Section.

B. Requirements specified in Division 16 Section "Basic Electrical Requirements" apply to this Section.

1.02 SUMMARY

A. This Section includes the following basic electrical materials and methods to complement other Division 16 Sections and for application with electrical installations:

1. Supporting devices for electrical components.
2. Electrical identification.
3. Joint sealers for sealing around electrical materials and equipment; and for sealing penetrations in fire and smoke barriers, floors, and foundation walls.

1.03 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 16 Section "Basic Electrical Requirements."

B. Product data for the following products:

1. Joint sealers.

1.04 PROJECT CONDITIONS

A. Environmental Conditions: Apply joint sealers under temperature and humidity conditions within the limits permitted by the joint sealer manufacturer. Do not apply joint sealers to wet substrates.

1.05 SEQUENCING AND SCHEDULING

A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

C. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

2.00 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

1. Elastomeric Joint Sealers:

a) One-Part, Mildew-Resistant, Silicone Sealant:

(i) "863 #345 White," Pecora Corp.
(ii) "Rhodorsil 6B White," Rhone-Poulenc, Inc.
(iii) "Proglaze White," Tremco Corp.
(iv) "OmniPlus," Sonneborn Building Products Div.

2.02 SUPPORTING DEVICES

A. Channel and angle support systems, hangers, anchors, sleeves, brackets, fabricated items, and fasteners are designed to provide secure support from the building structure for electrical components.

1. Material: Steel, except as otherwise indicated, protected from corrosion with zinc coating or with treatment of equivalent corrosion resistance using approved alternative finish or inherent material characteristics.
2. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel, except as otherwise indicated.

B. Steel channel supports have 9/16-inch (14-mm) diameter holes at a maximum of 8 inches (203 mm) o.c., in at least 1 surface.

C. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring steel clamps or "click"- type hangers.

D. Expansion Anchors: Carbon-steel wedge or sleeve type.

E. Toggle Bolts: All-steel springhead type.

F. Powder-Driven Threaded Studs: Heat-treated steel.

2.03 ELECTRICAL IDENTIFICATION

A. Manufacturer's Standard Products: Where more than one type is listed for a specified application, selection is Installer's option, but provide single type for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.

B. Engraved, Plastic-Laminated Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched for mechanical fasteners 1/16-inch (1.6-mm) minimum thick for signs up to 20 sq. in. (129 sq. cm), 1/8 inch (3.2 mm) thick for larger sizes. Engraved legend in black letters on white face.

C. Fasteners for Plastic-Laminated and Metal Signs: Self-tapping stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

2.04 MISCELLANEOUS METALS

A. Steel plates, shapes, bars, and bar grating: ASTM A 36.

B. Cold-Formed Steel Tubing: ASTM A 500.

C. Hot-Rolled Steel Tubing: ASTM A 501.

D. Steel Pipe: ASTM A 53, Schedule 40, welded.

E. Fasteners: Zinc-coated, type, grade and class as required.

2.05 JOINT SEALERS

A. General: Joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application.

B. Elastomeric Joint Sealers: Provide the following types:

1. One-part, mildew-resistant, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for glass, aluminum, and non-porous joint substrates; formulated with fungicide; intended for sealing interior joints with non-porous substrates; and subject to in-service exposure to conditions of high humidity and temperature extremes.

2.06 TOUCHUP PAINT

A. Equipment: Equipment manufacturer's paint selected to match installed equipment finish.

B. Nonequipment Surfaces: Matching type and color of undamaged, existing adjacent finish.

C. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

3.00 EXECUTION

3.01 ELECTRICAL EQUIPMENT INSTALLATION

A. Headroom Maintenance: Install components and equipment to provide the maximum possible headroom where mounting heights or other location criteria are not indicated.

B. Materials and Components: Install items level, plumb, and parallel and perpendicular to other building systems and components, except where otherwise indicated.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

3.02 WIRING METHODS

A. Refer to Specification Section 16120.

3.03 ELECTRICAL SUPPORTING METHODS

A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.

B. Dry Locations: Steel materials.

C. Support Clamps for PVC Raceways: Click-type clamp system.

D. Selection of Supports: Comply to manufacturer's written instructions.

E. Strength of Supports: Adequate to carry all present and future loads, times a safety factor of at least 4; 200-lb- (90-kg-) minimum design load.

3.04 INSTALLATION

A. Conductor Splices: Keep to the minimum and comply with the following:

1. Install splices and taps that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
2. Use splice and tap connectors that are compatible with conductor material.

B. Wiring at Outlets: Install with at least 12 inches (300 mm) of slack conductor at each outlet.

C. Connect outlets and components to wiring systems and to ground as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals according to tightening requirements specified in UL 486A.

D. Install devices to securely and permanently fasten and support electrical components.

E. Raceway Supports: Comply with NFPA 70 and the following requirements:

1. Conform to manufacturer's recommendations for selecting and installing supports.
2. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
3. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
4. Support individual horizontal raceways with separate, malleable iron pipe hangers or clamps.
5. Hanger Rods: 1/4-inch (6-mm) diameter or larger threaded steel, except as otherwise indicated.
6. Spring Steel Fasteners: Specifically designed for supporting single conduits or tubing. May be used in lieu of malleable iron hangers for 1-1/2-inch (38-mm) and smaller raceways serving lighting and receptacle branch circuits and for fastening raceways to channel and slotted angle supports.

F. Miscellaneous Supports: Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull boxes, junction boxes, transformers, and other devices except where components are mounted directly to structural features of adequate strength.

G. In open overhead spaces, cast boxes threaded to raceways need not be separately supported, except where used for fixture support; support sheet-metal boxes directly from the building structure or by bar hangers. Where bar hangers are used, attach the bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches (610 mm) from the box.

H. Fastening: Unless otherwise indicated, securely fasten electrical items and their supporting hardware to the building structure. Perform fastening according to the following:

1. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
2. New Concrete: Concrete inserts with machine screws and bolts.
3. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in existing concrete.
4. Steel: Welded threaded studs or spring-tension clamps on steel.

    a) Field Welding: Comply with AWS D1.1.

5. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
6. Light Steel: Sheet-metal screws.
7. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.
8. Fill and seal holes drilled in concrete and not used.

I. Install concrete pads and bases according to requirements of this Section.

3.05 IDENTIFICATION MATERIALS AND DEVICES

A. Install labels where indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated on the Contract Documents or required by codes and standards. Use consistent designations throughout the Project.

C. Self-Adhesive Identification Products: Clean surfaces of dust, loose material, and oily films before applying.

D. Tag or label power circuits for future connection and circuits in raceways and enclosures with other circuits. Identify source and circuit numbers in each cabinet, pull box, junction box, and outlet box. Color coding may be used for voltage and phase indication.

E. For panelboards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker. Modify any existing panel schedules to reflect changes made under this contract.

F. Color-Code Conductors: Secondary service, feeder, and branch circuit conductors throughout the secondary electrical system.

1. 120/208-V System as follows:

    a) Phase A: Black.
    b) Phase B: Red.
    c) Phase C: Blue.
    d) Neutral: White.
    e) Ground: Green

2. 277/480-V System as follows:

   a) Phase A: Yellow.
   b) Phase B: Brown.
   c) Phase C: Orange.
   d) Neutral: White with blue stripe.
   e) Ground: Green.

3. Factory-apply color the entire length of the conductors, except the following field-applied, color-coding methods may be used in lieu of factory-coded wire for sizes larger than No. 10 AWG.

   a) Colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply the last 2 turns of tape with no tension to prevent possible unwinding. Use 1-inch- (25-mm-) wide tape in colors as specified. Adjust tape bands to avoid obscuring cable identification markings.

3.06 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting installation and application of joint sealers and access panels. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.07 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

B. Field Welding: Comply with AWS "Structural Welding Code."

3.08 APPLICATION OF JOINT SEALERS

A. Surface Cleaning for Joint Sealers: Clean surfaces of joints immediately before applying joint sealers to comply with recommendations of joint sealers manufacturer.

B. Apply joint sealer primer to substrates as recommended by joint sealer manufacturer. Protect adjacent areas from spillage and migration of primers, using masking tape. Remove tape immediately after tooling without disturbing joint seal.

C. General: Comply with joint sealer manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.

   1. Comply with recommendations of ASTM C 962 for use of elastomeric joints sealers.

D. Tooling. Immediately after sealing application and prior to time shinning or curing begins, tool sealant to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

END OF SECTION 16050

DIVISION 16 - ELECTRICAL

SECTION 16060 - GROUNDING AND BONDING

1.00 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 this Section.

B. Related Sections: The following Division 16 Sections contain requirements that relate to this Section.

1. "Basic Electrical Requirements."
2. "Basic Electrical Materials and Methods."

1.02 SUMMARY

A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1. Comply with UL 467.

2.00 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

1. Grounding Conductors, Cables, Connectors, and Rods:

a) Apache Grounding/Erico Inc.
b) Chance/Hubbell.
c) Copperweld Corp.
d) O-Z/Gedney Co.; a business of the EGS Electrical Group.
e) Raco, Inc.; Division of Hubbell.
f) Salisbury: W. H. Salisbury & Co.
g) Superior Grounding Systems, Inc.
h) Thomas & Betts, Electrical.

2.02 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Division 16 Section 16120.

B. Material: Copper.

C. Equipment Grounding Conductors: Insulated with green-colored insulation.

D. Grounding Electrode Conductors: Stranded cable.

E. Bare Copper Conductors: Comply with the following:

1. Solid Conductors: ASTM B 3.
2. Assembly of Stranded Conductors: ASTM B 8.

F. Copper Bonding Conductors: As follows:

1. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.

2.03 CONNECTOR PRODUCTS

A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.

C. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

3.00 EXECUTION

3.01 APPLICATION

A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.

B. In raceways, use insulated equipment grounding conductors.

C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections, except those at test wells.

3.02 EQUIPMENT GROUNDING CONDUCTORS

A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

B. Install equipment grounding conductors in all feeders and circuits.

C. Install insulated equipment grounding conductor with circuit conductors for the following items, in addition to those required by NEC:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single and three-phase motor and appliance branch circuits.
5. Flexible raceway runs.

D. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.

3.03 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Bond interior metal piping systems to equipment grounding conductors of associated pumps, fans, blowers, electric heaters, and air cleaners. Use braided-type bonding straps.

3.04 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
2. Make connections with clean, bare metal at points of contact.

B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

D. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A [and UL 486B].

E. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

F. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

END OF SECTION 16060

DIVISION 16 – ELECTRICAL

SECTION 16120 – CONDUCTORS AND CABLES

1.00 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 this Section.

B. Related Sections: The following Division 16 Sections contain requirements that relate to this Section.

1. "Basic Electrical Requirements."
2. "Basic Electrical Materials and Methods."

1.02 SUMMARY

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 16 Section "Basic Electrical Requirements."

1.04 QUALITY ASSURANCE

A. Listing and Labeling: Provide wires and cables specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.

B. Comply with NFPA 70.

1.05 COORDINATION

A. Coordinate layout and installation of cables with other installations.

B. Revise locations and elevations from those indicated, as required to suit field conditions and as approved by Engineer.

2.00 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

1. Wires and Cables:

a) Alcan Aluminum Corporation; Alcan Cable Div.
b) American Insulated Wire Corp.; Leviton Manufacturing Co.
c) BICC Brand-Rex Company.
d) Carol Cable Co., Inc.
e) Senator Wire & Cable Company.
f) Southwire Company.
g) Rome

2. Connectors for Wires and Cables:

a) AMP Incorporated.
b) General Signal; O-Z/Gedney Unit.
c) Monogram Co.; AFC.
d) Square D Co.; Anderson.
e) 3M Company; Electrical Products Division.

2.02 BUILDING WIRES AND CABLES

A. UL-listed building wires and cables with conductor material, insulation type, cable construction, and rating as specified in Part 3 "Wire and Insulation Applications" Article.

B. Thermoplastic Insulation Material: Comply with NEMA WC 5.

C. Conductor Material: Copper.

D. Stranding: Solid conductor for No. 10 AWG and smaller; stranded conductor for larger than No. 10 AWG.

2.03 CONNECTORS AND SPLICES

A. UL-listed, factory-fabricated wiring connectors of size, ampacity rating, material, type, and class for application and service indicated. Comply with Project's installation requirements and as specified in Part 3 "Wire and Insulation Applications" Article.

3.00 EXECUTION

3.01 EXAMINATION

A. Examine raceways and building finishes to receive wires and cables for compliance with requirements for installation tolerances and other conditions affecting performance of wires and cables. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 WIRE AND INSULATION APPLICATIONS

A. Service Conductors: Type RHW or THWN, in raceway.

B. Feeders: Type THHN/THWN, in raceway.

1. Optional Panelboard Feeder Conductor Material: At Contractor's option, Stabiloy, aluminum-alloy conductor material may be used in lieu of copper. Conductor and raceway sizes must be changed to account for change in material.

C. Branch Circuits: Type THHN/THWN, in raceway.

3.03 INSTALLATION

A. Install wires and cables as indicated, according to manufacturer's written instructions and NECA's "Standard of Installation."

B. Pull Conductors: Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Identify wires and cables according to Division 16 Section "Basic Electrical Materials and Methods."

3.04 CONNECTIONS

A. Conductor Splices: Keep to minimum.

B. Install splices and tapes that possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.

C. Use splice and tap connectors compatible with conductor material.

D. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.

E. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer.

F. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.05 FIELD QUALITY CONTROL

A. Testing: On installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

B. Correct malfunctioning conductors and cables at Project site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

END OF SECTION 16120

DIVISION 16 – ELECTRICAL

SECTION 16130 – RACEWAYS AND BOXES

1.00 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 this Section.

B. Related Sections: The following Division 16 Sections contain requirements that relate to this Section:

1. "Basic Electrical Requirements."
2. "Basic Electrical Materials and Methods" for raceways and box supports.
3. "Wiring Devices" for devices installed in boxes and for floor-box service fittings.

1.02 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1. Raceways include the following:

a) Rigid metal conduit (RMC).
b) Electrical metallic tubing (EMT).
c) Flexible metal conduit (FMC).
d) Liquidtight flexible metal conduit (LFMC).
e) Rigid nonmetallic conduit (RNC).

2. Boxes, enclosures, and cabinets include the following:

a) Device boxes.
b) Outlet boxes.
c) Pull and junction boxes.
d) Cabinets and hinged-cover enclosures.

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 16 Section "Basic Electrical Requirements."

B. Product Data: For raceways, wireways and fittings, hinged-cover enclosures, and cabinets.

1.04 QUALITY ASSURANCE

A. Listing and Labeling: Provide raceways and boxes specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.

B. Comply with NFPA 70.

2.00 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

1. Metal Conduit and Tubing:

   a) AFC Cable Systems, Inc.
   b) Alflex Corp.
   c) Anamet, Inc.; Anaconda Metal Hose.
   d) Grinnell Co.; Allied Tube and Conduit Div.

2. Nonmetallic Conduit and Tubing:

   a) Anamet, Inc.; Anaconda Metal Hose.
   b) Hubbell, Inc.; Raco, Inc.
   c) Lamson & Sessions; Carlon Electrical Products.
   d) Thomas & Betts Corp.

3. Conduit Bodies and Fittings:

   a) American Electric; Construction Materials Group.
   b) Crouse-Hinds; Div. of Cooper Industries.
   c) Emerson Electric Co.; Appleton Electric Co.
   d) Hubbell, Inc.; Killark Electric Manufacturing Co.
   e) Lamson & Sessions; Carlon Electrical Products.
   f) O-Z/Gedney; Unit of General Signal.
   g) Scott Fetzer Co.; Adalet-PLM.
   h) Spring City Electrical Manufacturing Co.

4. Boxes, Enclosures, and Cabinets:

   a) American Electric; FL Industries.
   b) Crouse-Hinds; Div. of Cooper Industries.
   c) Hubbell Inc.; Killark Electric Manufacturing Co.
   d) Hubbell Inc.; Raco, Inc.
   e) Lamson & Sessions; Carlon Electrical Products.
   f) O-Z/Gedney; Unit of General Signal.
   g) Scott Fetzer Co.; Adalet-PLM.
   h) Spring City Electrical Manufacturing Co.
   i) Thomas & Betts Corp.

2.02 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. EMT and Fittings: ANSI C80.3.

1. Fittings: Compression type. (Steel Only)

C. LFMC: Flexible steel conduit with PVC jacket.

D. Fittings: NEMA FB 1; compatible with conduit/tubing materials.

2.03 NONMETALLIC CONDUIT AND TUBING

A. RNC: NEMA TC 2, Schedule 40 or 80 PVC.

B. RNC Fittings: NEMA TC 3; match to conduit or conduit/tubing type and material.

C. LFNC: UL 1660.

2.04 OUTLET AND DEVICE BOXES

A. Sheet Metal Boxes: NEMA OS 1.

B. Cast-Metal Boxes: NEMA FB 1, Type FD, cast box with gasketed cover.

2.05 PULL AND JUNCTION BOXES

A. Small Sheet Metal Boxes: NEMA OS 1.

B. Cast-Metal Boxes: NEMA FB 1, cast aluminum with gasketed cover.

2.06 ENCLOSURES AND CABINETS

A. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

B. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Include metal barriers to separate wiring of different systems and voltage, and include accessory feet where required for freestanding equipment.

3.00 EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 WIRING METHODS

A. Outdoors: Use the following wiring methods:

1. Exposed: Rigid steel.
2. Concealed: Rigid steel.
3. Underground, Single Run: RNC.
4. Underground, Grouped: RNC.
5. Connection to Vibrating Equipment (Including Electric Solenoid, or Motor-Driven Equipment): LFMC.
6. Boxes and Enclosures: NEMA 250, Type 4.

B. Indoors: Use the following wiring methods:

1. Exposed: Rigid steel conduit.
2. Concealed: EMT.
3. Connection to Vibrating Equipment (Including Electric Solenoid, or Motor-Driven Equipment): LFMC.
4. Damp or Wet Locations: Rigid steel conduit.
5. Boxes and Enclosures in Damp or Wet Locations.: NEMA 250, Type 4, stainless steel.

3.03 INSTALLATION

A. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.

B. Minimum Raceway Size: 3/4-inch trade size (DN21).

C. Install raceways level and square and at proper elevations. Provide adequate headroom.

D. Complete raceway installation before starting conductor installation.

E. Support raceways as specified in Division 16 Section "Basic Electrical Materials and Methods."

F. Use temporary closures to prevent foreign matter from entering raceways.

G. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

H. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.

I. Use raceway fittings compatible with raceways and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings, unless otherwise indicated.

J. Run concealed raceways, with a minimum of bends, in the shortest practical distance considering the type of building construction and obstructions, unless otherwise indicated.

K. Raceways Embedded in Slabs: Install in middle third of slab thickness where practical, and leave at least 1-inch (25-mm) concrete cover.

1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
2. Space raceways laterally to prevent voids in concrete.
3. Run conduit larger than 1-inch trade size (DN27) parallel to or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
4. Transition from nonmetallic tubing to Schedule 80 nonmetallic conduit, rigid steel conduit, or IMC before rising above floor.

L. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.

1. Run parallel or banked raceways together, on common supports where practical.

2. Make bends in parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

M. Join raceways with fittings designed and approved for the purpose and make joints tight.

1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.
2. Use insulating bushings to protect conductors.

N. Terminations:

1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against the box. Use 2 locknuts: 1 inside and 1 outside the box.
2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align raceways so the coupling is square to the box and tighten the chase nipple so no threads are exposed.

O. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of the pull wire.

P. Telephone and Signal System Raceways, 2-Inch Trade Size (DN53) and Smaller: In addition to the above requirements, install raceways in maximum lengths of 150 feet (45 m) and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.

Q. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; LFMC may be used 6 inches (150 mm) above the floor. Install screwdriver-operated, threaded flush plugs flush with floor for future equipment connections.

R. Flexible Connections: Use maximum of 6 feet (1830 mm) of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquidtight flexible conduit in wet or damp locations. Install separate ground conductor across flexible connections.

S. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

3.04 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure coatings, finishes, and cabinets are without damage or deterioration at the time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to paint finishes with matching touchup coating recommended by manufacturer.

3.05 CLEANING

On completion of installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

END OF SECTION 16130

DIVISION 16 - ELECTRICAL

SECTION 16220 – CLARIFIER DRIVES

1.00 GENERAL

1.01 DESCRIPTION OF WORK

A. Replacement of five (5) electric drive assemblies for the WWTP. There are two (2) 56' diameter primary, two (2) 56' diameter secondary clarifiers and one (1) 27' diameter chlorination clarifier at the site.

B. Applicable Sections: 09900 Paints and Coatings; section 16010 Basic Electrical Requirements; Section 16050 basic Electrical Materials and Methods; 16060 Grounding and Bonding; 16120 Conductors and Cables; 16130 Raceways and Boxes; 16410 Enclosed Switches and Circuit Breakers.

2.00 PRODUCTS

2.01 CRITERIA

A. Drive assemblies shall be provided to replace the existing drives that are currently in place on these clarifiers. All required adapters, base plates, flanges, hubs, etc. shall be provided to attach the new worm gear drives to the existing bridges and to the existing torque tube of the clarifiers with a minimal amount of modification. The drive supplier shall be capable of manufacturing, machining, testing and warrantying that all the drive components shall meet the specifications and are inspected, manufactured, assembled, and tested in the manufacturers own facility. The manufacturer of the drives shall be located within 250 miles and stock the spare parts for the specified drives. Drives shall be provided by AMWELL– Aurora, IL. No equal clarifier drives shall be allowed unless preapproved by the engineer and added by addendum.

B. Space requirements and equipment configurations are critical. It has been determined that the AMWELL clarifier drive systems fit the installation parameters. The drawings and specifications are based specifically on the AMWELL sizing and design. Should the contractor wish to offer an alternate manufacturer, it shall be reviewed as an alternate per the General Condition's equivalents and substitutions. The contractor shall be responsible for all costs associated with the alternate. The Owner reserves all rights to accept or reject any alternates. Any cost savings realized by the contractor as a result of the substitution shall be passed on to the Owner.

C. Alternate drive manufacturers shall submit, within 21 days prior to the bid opening, substantial descriptive information to the engineer so that a determination may be made as to whether or not the proposed alternate is equal to that specified. Proposals from drive manufacturers who do not design and manufacture the entire clarifier drive mechanism in their own facility or who use fabricated steel housings or grease lubrication in the main bearing shall not be allowed.

2.02 WORM GEAR DRIVE

A. The collector drive worm gear assembly shall consist of a gear motor, drive and driven sprockets with drive chain, intermediate worm gear speed reducer, output shaft with rigid coupling, combination cast iron drive support and bearing housing, overload alarm and cut-off actuating system.

B. The drives shall be based on the following torque requirements:

Clarifier Location	Cont. Torque (ft-lbs)	Alarm Torque (ft-lbs)	Cut off Torque (ft-lbs)	Shear Pin Torque (ft-lbs)
Primary & Secondary	7,800	7,800	9,400	11,700
Chlorination	1,800	1,800	2,100	2,700

C. The gear motor shall be of the totally enclosed parallel-helical horizontal type, mounted on top of the worm gear housing. The totally enclosed motor shall operate on 3 phase, 60 hertz, 230/460 volt power and shall be rated at a minimum 1/2 HP and be designed for outdoor service. The motor shall be a NEMA design B with sealed ball bearings, continuous duty, 40° C ambient,1.25 service factor with Class B Insulation. Cycloidal gearing is not acceptable.

D. The worm gear reduction unit shall consist of a worm gear with a minimum pitch diameter and a face width as shown in the following table driven by an integral worm and shaft supported by anti-friction, grease lubricated ball bearings running in an oil bath. The worm and shaft shall be fabricated from heat-treated 8620 alloy steel. The worm gear shall be centrifugally cast bronze keyed to a cast iron hub. The horizontal gear motor shall drive the worm shaft through steel, self-lubricated roller chain with steel sprockets, all enclosed in an OSHA approved stainless steel guard.

E. An oversized ESCO (no equal) oil sight glass and level monitor shall be provided on all of the replacement worm gear drives. The sight glass shall allow the drainage of condensation from the drive. The sight glass shall be constructed of clear cast acrylic body to allow for viewing of the oil level.

F. The following gear specifications shall apply:

Clarifier Location	Minimum Worm Gear Pitch Diameter	Minimum Worm Gear Face Width
Primary & Secondary	16.50"	2-3/4"
Chlorination	9.59"	1-3/4"

G. The drive output shaft shall be fabricated of alloy steel and provided with a rigid steel or cast iron coupling for connecting to the existing collector mechanism torque tube or solid shaft.

H. The center drive mechanism, as well as other parts of the machine, shall be designed to withstand a momentary peak torque equal to twice the continuous output torque rating of the drive unit. Each center mechanism and drive unit shall be capable of sustaining operation at the continuous torque rating without excessive wear and to develop the peak torque rating without damage to, or failure of, the drive components. The drive shall be designed in conformance to the latest revision of ANSI/AGMA 6034-B92,"Practice for Enclosed Cylindrical Worm Gear Speed Reducers and Gear motors" for 24 hour continuous duty and a 20 year design life. Anti-friction bearings shall have a B10 minimum life of 20 years based on the continuous torque.

I. The primary clarifier shall be designed to rotate at a speed of approximately 10 FPM and the secondary and chlorination clarifier at a speed of approximately 6-8 FPM.

J. The drive shall be provided with an indicating overload device actuated by thrust from the worm shaft, which shall operate two (2) limit switches enclosed in a stainless steel enclosure. One switch shall have an electrically isolated N.O. contact, which shall operate a remote alarm when the load on the mechanism reaches a preset level. The other switch, which shall have an electrically isolated N.C. contact, shall open the motor circuit when a preset overload occurs. The overload switches shall be enclosed in weatherproof housings. A shear pin coupling shall also be provided for additional protection and set as indicated above.

3.00 EXECUTION

3.01 PAINTING

A. The primary gear reduction unit will have that manufacturer standard paint system designed for continuous outdoor service. Interior and exterior surfaced of all castings and steel bases to be solvent cleaned in accordance with SSPC specifications SP-1-63 for casting of this design and SP-6 for the steel base and given two (2) shop coats of rust prohibitive primer equal to Tnemec No. 69 Epoxoline.

3.02 OILS AND GREASE

A. All bearings are packed with grease. Primary reduction unit is filled with break in oil. Intermediate and final reduction units are shipped without oil. Consult manuals prior to start-up for type and quantity required.

3.03 SERVICE

A. The drive manufacturer shall provide a minimum of four (4) days of field service in a minimum of two (2) trips to check the installation alignments, instruct owners personnel on lubrication and operation requirements after installation.

B. The manufacturer of the clarifier drives shall visit the site to confirm all required dimensions before submitting the approvals for the proposed drives.

3.04 SPARE PARTS

A. Each drive shall be furnished with twelve (12) shear pins of the required size.

END OF SECTION 16220

DIVISION 16 – ELECTRICAL

SECTION 16410 – ENCLOSED SWITCHES AND CIRCUIT BREAKERS

1.00 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 this Section.

B. Related Sections: The following Division 16 Sections contain requirements that relate to this Section.

1. "Basic Electrical Requirements."
2. "Basic Electrical Materials and Methods."
3. "Fuses" for fusible devices.

1.02 SUMMARY

A. This Section includes individually mounted enclosed switches and circuit breakers used for the following:

1. Feeder and branch-circuit protection.
2. Motor and equipment disconnecting means.

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 16 Section "Basic Electrical Requirements."

B. Product Data: For each type of switch, circuit breaker, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

C. Shop Drawings: For each switch and circuit breaker.

1. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. Include the following:

a) Enclosure types and details for types **other than** NEMA 250, Type 1.
b) Current and voltage ratings.
c) Short-circuit current rating.
d) UL listing for series rating of installed devices.
e) Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

2. Maintenance Data: For enclosed switches and circuit breakers and for components to include in maintenance manuals specified in Division 16 Section "Basic Electrical Requirements." In addition, include the following:

a) Routine maintenance requirements for components.
b) Manufacturer's written instructions for testing and adjusting switches and circuit breakers.

1.04 QUALITY ASSURANCE

A. Testing Agency Qualifications: Testing agency that is a member company of the International Electrical Testing Association and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the International Electrical Testing Association or National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NFPA 70.

1.05 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

2.00 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

1. Enclosed Switches:

a) Eaton Corp.; Cutler-Hammer Products.
b) Siemens Energy & Automation, Inc.
c) Square D Co.

2. Molded-Case Circuit Breakers:

a) Eaton Corp.; Cutler-Hammer Products.
b) Siemens Energy & Automation, Inc.
c) Square D Co.

2.02 ENCLOSED SWITCHES

A. Enclosed, Nonfusible Switch: NEMA 1, Type HD, with lockable handle for interior installations. Provide NEMA 3R, Type HD, with lockable handle for exterior installations.

B. Enclosed, Fusible Switch: NEMA 1, Type HD, with clips to accommodate specified fuses, lockable handle, and interlocked with cover in closed position for interior installations. Provide NEMA 3R, Type HD, with clips to accommodate specified fuses, lockable handle, and interlocked with cover in closed position for exterior installations.

2.03 ENCLOSED CIRCUIT BREAKERS

A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2.04 ENCLOSURES

A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.

1. Outdoor Locations: NEMA 250, Type 3R
2. Corrosive, Wet or Damp Interior Environment: NEMA 250, Type 4X, stainless steel.

2.05 FACTORY FINISHES

A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested enclosures before shipping.

3.00 EXECUTION

3.01 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Comply with manufacturer's written instructions.

3.03 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Basic Electrical Materials and Methods."

B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.04 CONNECTIONS

A. Install equipment grounding connections for switches and circuit breakers with ground continuity to main electrical ground bus.

B. Install power wiring. Install wiring between switches and circuit breakers, and control and indication devices.

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.05 FIELD QUALITY CONTROL

A. Testing: After installing enclosed switches and circuit breakers and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.06 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

3.07 CLEANING

A. On completion of installation, inspect interior and exterior of enclosures. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 16410

DIVISION 16 – ELECTRICAL

SECTION 16510 – LIGHTING

1.00 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 this Section.

B. Related Sections: The following Division 16 Sections contain requirements that relate to this Section:

1. "Basic Electrical Requirements."
2. "Basic Electrical Materials and Methods."

1.02 SUMMARY

A. This Section includes lighting fixtures, lamps, ballasts, emergency lighting units, pole standards and accessories.

1.03 DEFINITIONS

A. Fixture: A complete lighting unit, exit sign, or emergency lighting unit. Fixtures include lamps and parts required to distribute light, position and protect lamps, and connect lamps to power supply. Internal battery-powered exit signs and emergency lighting units also include a battery and the means for controlling and recharging the battery. Emergency lighting units include ones with and without integral lamp heads.

1.04 SUBMITTALS

A. General: Submit the following in accordance with Conditions of the Contract and Division 16 Section "Basic Electrical Requirements."

B. Product Data describing fixtures, lamps, ballasts, and emergency lighting units. Arrange Product Data for fixtures in order of fixture designation. Include data on features and accessories and the following:

1. Outline drawings indicating dimensions and principal features of fixtures.
2. Battery and charger data for emergency lighting units.

C. Shop Drawings: Show details of nonstandard or custom fixtures. Indicate dimensions, weights, method of field assembly, components, features, and accessories.

1. Wiring Diagrams: Detail wiring for fixtures and differentiate between manufacturer-installed and field-installed wiring.

1.05 QUALITY ASSURANCE

A. Fixtures, Emergency Lighting Units, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

B. Comply with NFPA 70.

C. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

1.06 COORDINATION

A. Fixtures, Mounting Hardware, and Trim: Coordinate layout and installation of lighting fixtures with ceiling system and other construction.

2.00 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, provide one of the products specified in each Interior Lighting Fixture Schedule.

1. Lighting Fixtures:

a) Abolite Lighting, Inc.
b) Columbia Div., USI Lighting
c) Emco Environmental Lighting Div., Thomas Industries, Inc.
d) Devine
e) Dual-lite
f) Emergi-Lite, Inc.
g) Halo Lighting Div; McGraw-Edison Co.
h) High-Lites, Inc.
i) Hi-Tek Div.; Lithonia
j) Hubbell/Lighting Division
k) Infinity Lighting, Inc.
l) Kenall
m) Lithonia Lighting Div; Nat.'l Service Ind. Inc.
n) Metalux Div.; Cooper Industries Co.
o) McGraw Edison
p) Prescolite Div., USI Lighting
q) Sure-Lites Div.; Cooper Industries
r) Stonco
s) H.E. Williams, Inc.

2.02 INTERIOR FIXTURES AND FIXTURE COMPONENTS, GENERAL

A. Metal Parts: Free from burrs, sharp corners, and edges.

B. Sheet Metal Components: Steel, except as indicated. Form and support to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating position.

2.03 EXTERIOR FIXTURES AND FIXTURE COMPONENTS, GENERAL

A. Comply with IESNA RP-8 for parameters of lateral light distribution patterns for exterior lighting fixtures.

B. Metal Parts: Free from burrs, sharp edges, and corners.

C. Sheet Metal Components: Corrosion-resistant aluminum, except as otherwise indicated. Form and support to prevent warping and sagging.

D. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed fixtures.

E. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers,

and other pieces to prevent accidental falling during relamping and when secured in operating position. Provide for door removal for cleaning or replacing lens. Arrange for door opening to disconnect ballast.

F. Exposed Hardware Material: Stainless steel.

G. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

H. Lenses and Refractors: Materials as indicated. Use heat- and aging-resistant, resilient gaskets to seal and cushion lens and refractor mounting in fixture doors.

I. Photoelectric Relays: Conform to UL 773.

1. Contact Relays: Single throw, arranged to fail in the ON position and factory set to turn light unit on at 1.5 to 3 foot-candles (16 to 32 lux) and off at 4.5 to 10 foot-candles (48 to 108 lux) with 15-second minimum time delay.
2. Relay Mounting: In fixture housing.

2.04 FINISHES

A. Manufacturer's standard, except as otherwise indicated, applied over corrosion-resistant treatment or primer, free of streaks, runs, holidays, stains, blisters, and similar defects. Finishes shall be applied after fixture fabrication when available.

3.00 EXECUTION

3.01 INSTALLATION

A. Fixtures: Set level, plumb, and square with ceiling and walls, and secure according to manufacturer's written instructions and approved submittal materials. Install lamps in each fixture.

B. Fixture Attachment: Fasten to indicated structural supports.

3.02 CONNECTIONS

A. Make electrical connections to lighting fixtures prior to energizing circuits in order to avoid premature ballast failure or damage.

3.03 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replaced damaged fixtures and components.

B. Replace or repair malfunctioning fixtures and components, then retest. Repeat procedure until all units operate properly.

3.04 CLEANING AND ADJUSTING

A. Clean fixtures internally and externally after installation. Use methods and materials recommended by manufacturer.

END OF SECTION 16510