Rock River Water Reclamation District
Rockford, Illinois

Bidding Requirements and Contract Forms

for

Screening Equipment Replacement

Capital Project No. 1858

Bid Doc. No. 18-418

Rock River Water Reclamation District
Rockford, Illinois

Bidding Requirements and Contract Forms
and
General Provisions and Technical Specifications
for
Sanitary Sewer Construction

for

Screening Equipment Replacement

Capital Project No. 1858

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Section I

Bidding Requirements

Article 1 — Notice to Bidders

The Rock River Water Reclamation District will receive sealed and signed bids for the Screening Equipment Replacement, Capital Project No. 1858, sewerage improvements at the Rock River Water Reclamation District offices, 3501 Kishwaukee Street, Rockford, Illinois until 10:00 a.m. on Monday, December 17, 2018 at which time and place all bids will be publicly opened and read aloud.

The Screening Equipment Replacement, Capital Project No. 1858, consists of the removal and replacement of 2 existing screens and 2 existing screenings washer compactors, including screenings discharge chutes, discharge piping, drain piping, and wash water piping. The 2 new screens, 2 new screen control panels, 2 new washer compactors, and screenings discharge piping shall be provided by the Owner and installed by the Contractor. The work also involves water piping replacement, drain piping replacement, electrical work, painting, and all other appurtenances as indicated on the plans and in the specifications.

Bidder's attention is called to Article 2 – Instructions to Bidders 3.8 requirements for Statement of Qualifications. Bidder must have a permanent business office within forty (40) miles of the District office at 3501 Kishwaukee Street in Rockford, IL.

The South Screen shall be functional within eight (8) weeks of the date of the Notice to Proceed – March 11, 2019. Liquidated damages for this milestone shall be $1,500 per calendar day until the South Screen is functional. The North Screen shall be functional within fourteen (14) weeks of the date of the Notice to Proceed – April 22, 2019. Liquidated damages for this milestone shall be $1,500 per calendar day until the North Screen is functional. All piping replacement, painting, restoration, testing, record documents, and other work shall be completed by May 31, 2019. Liquidated damages shall be $300.00 per calendar day for this final completion deadline.

Copies of the specifications may be obtained by depositing Fifty Dollars ($50.00) with the Rock River Water Reclamation District. The amount of the deposit for each set of specifications will not be refunded.

All construction will be done in accordance with specifications on file with the Rock River Water Reclamation District, including the *General Provisions and Technical Specifications for Sanitary Sewer Construction* (Current Edition) by the Rock River Water Reclamation District of Rockford.

Each proposal must be accompanied by the District Bid Bond form with an acceptable Bid Security attached, in the amount of **five (5%)** of the total bid price. This sum is a guarantee that, if the Proposal is accepted, a contract will be entered into and its performance properly secured.

A Mandatory Pre-Bid Meeting for this project will be held on Monday, December 3, 2018 at 10:00 a.m. at the RRWRD Board Room, 3501 Kishwaukee Street, Rockford, Illinois. All contractors that intend to bid on this project must attend the pre-bid meeting.

Bid documents may be obtained by contacting the Engineering Department at the Rock River Water Reclamation District, (815) 387-7660, 3501 Kishwaukee St. For more information, visit the District web site at www.rrwrd.dst.il.us. Plans and specifications are also available for viewing through the Northern Illinois Building Contractors Association, whose office is located at 1111 S. Alpine Rd, Rockford, IL.

The successful bidder will be required to furnish a satisfactory performance bond in the full amount of the bid or proposal. No bid shall be withdrawn without the consent of the District for a period of 60 days after the scheduled time of receiving bids.

The Rock River Water Reclamation District, reserves the right to reject any or all bids, or any part thereof, or to accept any bid or any part thereof, or to waive any formalities in any bids, deemed to be in the best interest of the Rock River Water Reclamation District.

Dated this 23rd day of November, 2018.

Chris Black

BY: Chris Black, Business Manager

Article 2 — Instructions to Bidders

1 General

1.1 Scope and Intent

This section of the contract documents is concerned with furnishing detailed information and requirements for preparing bids to prospective bidders, bidders' responsibility, the preparation and the submission of bids, basis for awarding the contract and other general information concerned with bidding and executing the contract.

1.2 Contradictions

If in the case of apparent contradiction between or among the Contract Documents, the Contract Documents shall be consulted in the following order: Addenda, Agreement, Supplementary Drawings, Instructions to Bidders, Detailed Specifications, Plans, District General Provisions and Technical Specifications for Sanitary Sewer Construction. The language in the first such document in which language regarding the conflict, error or discrepancy occurs shall control.

2 Legal Requirements

2.1 Illinois Regulations

1. The undersigned, as Bidder, declares he will comply with prevailing wages in accordance with the Illinois Department of Labor Standards. The State of Illinois requires contractors and subcontractors on public works projects (including Rock River Water Reclamation District) to submit certified payroll records on a monthly basis, along with a statement affirming that such records are true and accurate, that the wages paid to each worker are not less than the required prevailing rate and that the contractor is aware that filing false records is a Class B Misdemeanor.

   The certified payroll records must include the name, address, telephone number, social security number, job classification, hourly wages paid in each pay period, the number of hours worked each day, and the starting and ending time of work each day, for every worker employed on the project. Any contractor who fails to submit a certified payroll or knowingly files a false certified payroll is guilty of a Class B Misdemeanor. Certified payroll reports shall be submitted on standard IDOT forms.

2. Public Act 83–1030 entitled "Steel Products Procurement Act" requires that steel products used or supplied in performance of this contract or subcontract shall be manufactured or produced in the United States with three exceptions.

The provisions of this Section shall not apply:

   a. Where the contract involves an expenditure of less than $500.
   b. Where the executive head of the public agency certifies in writing that
      i. the specified products are not manufactured or produced in the United States in sufficient quantities to meet the agency's requirements, or
      ii. obtaining the specified products, manufactured or produced in the United States would increase the cost of the contract by more than 10%.
   c. When its application is not in the public interest.

3. Public Act 96-929 (30 ILCS 570) provides that Illinois residents be employed on Illinois public works projects, provided there has been a period of excessive unemployment (5%) in the State

of Illinois as defined in the Act; and, further, that Illinois workers are available and capable of performing the particular type work involved.

4. Public Act 99-0933 requires that any party to a contract adopt and promulgate written sexual harassment policies that include, as a minimum, the following information:

    a. the illegality of sexual harassment
    b. the definition of sexual harassment under Illinois State law
    c. a description of sexual harassment, utilizing examples
    d. my (our) organization's internal complaint process including penalties
    e. the legal recourse, investigative and complaint process available through the Illinois Department of Human Rights and the Illinois Human Rights Commission
    f. directions on how to contact the Department and the Commission
    g. protection against retaliation as provided by Section 6-101 of the Illinois Human Rights Act

    Upon request, this information shall be provided to the Illinois Department of Human Rights and the District.

5. With regard to nondiscrimination in employment, the Contractor for this project will be required to comply with the Illinois Fair Employment Practices Commission's Rules and Regulations.

6. The Contractor for this project shall comply with the Occupational Safety and Health Act.

7. The Contractor for this project shall comply with the Federal Drug-Free Workplace Act.

8. Public Act 96-1416 requires the Certification of Clean Construction and Demolition Debris (CCDD) and uncontaminated soil prior to disposal at a CCDD fill site. The Contractor for this project shall comply with Public Act 96-1416 and be responsible for the certifications and any fees associated with the disposal at a CCDD fill site.

    a. In the event that contaminated soil is uncovered on the project, the Contractor shall notify the District immediately. Any extra costs resulting from the presence of contaminated soil shall be evaluated in accordance with District General Provisions & Technical Specs for Sanitary Sewer Construction; General Conditions: Article 5 – Time Provisions and Article 8 – Changes.

2.2 Americans with Disabilities Act

The Contractor for this project will comply with all applicable requirements of the Americans with Disabilities Act of 1990 (ADA). The Contractor will hold harmless and indemnify Rock River Water Reclamation District (District) and their representatives from all:

1. suits, claims, or actions
2. costs, either for defense (including but not limited to reasonable attorney's fees and expert witness fees) or for settlement
3. damages of any kind (including but not limited to actual, punitive, and compensatory damages)

relating in any way to or arising out of the ADA, to which said firm is exposed or which it incurs in the execution of the contract.

3 General Instructions

3.1 Bidder's Responsibility

Bidders are cautioned not to submit proposals until having carefully examined the entire site of the proposed work and adjacent premises and the various means of approach and access to the site, and having made all necessary investigations to inform themselves thoroughly as to the facilities for delivering, placing and handling the materials at the site, and having informed themselves thoroughly as to all difficulties involved in the completion of all the work under this Contract in accordance with its requirements.

Bidders must examine the Plans, Specifications and other Contract Documents and shall exercise their own judgment as to the nature and amount of the whole of the work to be done and for the bid prices must assume all risk of variance, by whomsoever made, in any computation or statement of amount or quantities necessary to complete fully the work in strict compliance with the Contract Documents. The Bidder must satisfy himself by making borings or test pits, or by such methods as he may prefer, as to the character and location of the materials to be encountered or work to be performed. No pleas of ignorance of conditions that exist or that may hereafter exist, or of conditions or difficulties that may be encountered in the execution of the work under this Contract, as a result of failure to make the necessary examinations and investigations, will be accepted as an excuse for any failure or omission on the part of the Contractor to fulfill, in every detail, all of the requirements of the Contract Documents, or will be accepted as a basis for any claims whatsoever for extra compensation or for an extension of time.

The Contractor is responsible for verifying the location of all existing utilities in the project areas.

The Bidder, therefore, shall satisfy himself by such means as he may deem proper as to the location of all structures that may be encountered in construction of the work.

3.2 Addenda and Interpretations

No interpretation of the meaning of the Plans, Specifications, or other Contract Documents will be made to any bidder orally. Every request for such interpretation must be in writing addressed to the Rock River Water Reclamation District, 3501 Kishwaukee Street, Rockford, Illinois. To be given consideration, such request must be received at least five (5) days prior to the date fixed for the opening of bids. Any and all such interpretations and any supplemental instructions will be in the form of written addenda which, if issued, will be sent by email, fax, or certified mail with acknowledgement of receipt requested, to all prospective bidders, at the respective addresses furnished for such purposes, not later than three (3) days prior to the date fixed for the opening of bids. Failure of any bidder to receive any such addenda or interpretation shall not relieve said bidder from any obligation under his bid as submitted. All addenda so issued shall become part of the Contract Documents.

3.3 Laws and Regulations

The prospective bidder is warned that he must comply with all laws of the United States Government, State of Illinois, all ordinances and regulations of the District in the performance of the work under this contract. The Bidder's attention is specifically called to that provision of the General Conditions regarding the rate of wage to be paid on the work.

3.4 Quantities Estimated Only

Bidders are warned that the estimate of quantities of the various items of work and materials, as set forth in the proposal form, is approximate only and is given solely to be used as a uniform basis for the comparison of bids. The quantities actually required to complete the contract work may be less or more than so estimated, and if awarded a contract for the work specified, the Contractor further agrees that he will not make any claim for damages or for loss of profits or for an extension of time because of a difference between the quantities of the various classes of work assumed for comparison of bids and quantities of work actually performed.

3.5 Form, Preparation, and Presentation of Proposals

For particulars as to the quantity and quality of the supplies, materials and equipment to be furnished, and the nature and extent of the work or labor to be done, prospective bidders are referred to the Contract Documents, which may be examined or obtained at the office of the District.

Each bid will be submitted upon the prescribed proposal form. All blank spaces for bid prices must be filled in, in ink, with the unit or total sum or both for which the proposal is made. If the proposal contains any omissions, erasures, alterations, additions or items not called for in the itemized proposal, or contains irregularities of any kind, such may constitute sufficient cause for rejection of bid. In case of any discrepancy in the unit price or amount bid for any item in the proposal, the unit price as expressed in figures will govern. In no case is the agreement form to be filled out or signed by the bidder.

The Contractor may opt to contact the District's Engineering Department at 815.387.7660 to obtain an electronic Proposal form. If used, this form must be attached to the hard copy proposal form and appropriately signed and executed with the bid.

The bid must be verified and be presented on the prescribed form in a sealed envelope on or before the time and at the place stated in the Advertisement for Bids, endorsed with the name of the person, firm or corporation presenting it, the date of presentation, and the title of the work for which the bid is made. If forwarded by mail, the sealed envelope containing the proposal and marked as directed above, must be enclosed in another envelope addressed to Clerk of the Rock River Water Reclamation District, 3501 Kishwaukee Street, Rockford, Illinois, 61109 and be sent preferably by certified mail. The District will not accept facsimile generated bids.

3.6 Bid Security

Each proposal must be accompanied by the District Bid Bond form with an acceptable Bid Security attached, in the amount specified in Article One, Notice to Bidders. This sum is a guarantee that, if the Proposal is accepted, a contract will be entered into and its performance properly secured. The District's Bid Bond Form included in the bid packet must be used. No other Bid Bond form may be substituted.

Within ten (10) days after the opening of bids, the deposits of all but the three lowest bidders will be returned. The deposits of the remaining two unsuccessful bidders will be returned within three (3) days after the execution of the contract, or, if no such contract has been executed, within sixty (60) days after the date of opening bids. The deposit of the successful bidder will be returned only after he has duly executed the contract and furnished the required bond and insurance.

3.7 Affidavit of Compliance

Each proposal must be accompanied by an executed Affidavit of Compliance. A separate Affidavit of Compliance form is enclosed with the Proposal packet. Failure to submit an executed Affidavit of Compliance with the proposal may constitute sufficient cause for rejection of the bid.

3.8 Statement of Qualifications

Each proposal must be accompanied by a Statement of Qualifications certifying that the bidder is registered to do business in the State of Illinois, has a permanent business office within forty (40) miles of the District office at 3501 Kishwaukee Street in Rockford, IL, and provides documentation that the bidder possesses the appropriate financial, material, equipment, facility and personnel resources and expertise necessary to meet all contractual obligations. The bidder shall document no less than three (3) contracts for sanitary sewer system within the past five (5) years having equal or greater value to the bid being submitted. The District reserves the right to request additional information as needed to evaluate bids prior to making an award.

3.9 Comparison of Proposals

Bids on item contracts will be compared on the basis of a total computed price arrived at by taking the sum of the estimated quantities of each item, multiplied by the corresponding unit prices and including any lump sum bids on individual items, in accordance with the estimate of quantities set forth in the proposal form. Bids on lump sum contracts will be considered upon the basis of the lowest sum bid.

3.10 Acceptance of Bids and Basis of Award

No bidder may withdraw his bid after the scheduled closing time for receipt of bids, for at least sixty (60) days.

The contract will be awarded, if at all, to the lowest responsive, responsible bidder. The Rock River Water Reclamation District also reserves the right to reject any or all bids.

The bidder whose proposal is accepted shall enter into a written contract for the performance of the work and furnish the required bonds and insurance certificate within ten (10) days after written notice by the Engineering Manager of the District has been served on such bidder personally or by mailing a postpaid wrapper to such bidder at the address given in his proposal. If the bidder to whom the contract is awarded refuses or neglects to execute it or fails to furnish the required bond and insurance within five (5) days after receipt by him of the notice, the amount of his deposit shall be forfeited and shall be retained by the District as liquidated damage and not as a penalty. It being now agreed that said sum is a fair estimate of the amount of damages that the District will sustain in case said bidder fails to enter into a contract and furnish the required bond and insurance. No plea of mistake in the bid shall be available to the bidder for the recovery of his deposit or as a defense to any action based upon the neglect or refusal to execute a contract.

3.10.1 Evaluation of Responsiveness

The responsiveness of bidders will be judged on the basis of the completeness of the bid submitted. To be responsive, a Bid must be submitted on the forms provided as part of the Bid Documents and comply with all the requirements of the Instruction to Bidders.

3.10.2 Evaluation of Responsibility

To be judged as responsible, the bidder shall:

a. Have adequate financial resources for performance, the necessary experience, organization, technical qualifications, and facilities, or a firm commitment to obtain such by subcontracts;
b. Be able to comply with the required completion schedule for the project;
c. Have a satisfactory record of integrity, judgment, and performance, including, in particular, any prior performance on contracts from the District;
d. Have an adequate financial management system and audit procedures, that provide efficient and effective accountability and control of all property, funds, and assets;
e. Conform to the civil rights, equal employment opportunity and labor law requirements of the Bid Documents.
f. Have satisfactorily completed no less than three (3) sanitary sewer system contracts within the past five (5) years of equal or greater value to the bid being submitted.

3.11 The Rejection of Bids

The District reserves the right to reject any bid if the evidence submitted in the statement of the bidder's qualifications, or if investigation of such bidder fails to satisfy the District that such bidder is properly qualified to carry out the obligations and to complete the work contemplated therein. Any or all proposals will be rejected if there is reason to believe that collusion exists among the bidders. Conditional bids will not be accepted. The District reserves the right to reject any and all bids and to accept the bid which they deem most favorable to the interest of the District after all proposals have been examined and canvassed.

3.12 Insurance and Bonding

Contractor shall provide all necessary insurance and bonds required to complete the project. No more than ten (10) calendar days subsequent to the District's issuance of an award letter, the Contractor shall provide documentation to prove that he has obtained all required insurance and bonds. The District shall be the sole judge as to the acceptability of any such proof.

Contractor shall provide and maintain all insurance and bonds as required by the District.

3.12.1 General

The Contractor shall ensure that:

1. All insurance policies shall be specific to the project.

2. The insurance certificate shall state: This certifies that the insurance coverage meets or exceeds that required for the Screening Equipment Replacement, Capital Project No. 1858.

3. The District shall be named as Additional Insured in all policies; this shall include the Owners Contractors Protective Policy option.

4. All completed operations coverages and bonds shall remain in force for a period of two (2) years following acceptance of the project and completed operations shall stay in force for two (2) years following completion of the project.

3.12.2 Insurance

The Contractor shall, for the duration of the contract and for two (2) years following project acceptance, maintain the following:

1. General Liability: $1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to this project or the general aggregate limit shall be twice the required occurrence limit. The Contractor shall provide "XCU" coverage.

2. Automobile Liability: $1,000,000 combined single limit per accident for bodily injury and property damage including coverages for owned, hired or non‒owned vehicles, as applicable.

3. Workers' Compensation and Employers Liability: Workers' Compensation limits as required by statute and Employers Liability limits of $500,000 per accident and $500,000 per disease.

4. Umbrella: $2,000,000 per occurrence/aggregate for contracts valued at $500,000 or over, or $1,000,000 for contracts below $500,000. $10,000 is maximum allowable self-retained limit.

5. Errors and Omissions: If the Contractor performs professional services, he shall maintain errors and omissions insurance with a limit no lower than $1,000,000 for the duration of the contract.

The policies shall contain, or be endorsed to contain, the following provisions in the General Liability and Automobile Liability Coverage's:

a. Unless otherwise provided in paragraph "c" of this section, the District, its officers, officials, employees and volunteers shall be covered as additional insureds as respects liability arising out of activities performed by or on insured's general supervision of the Contractor, products and completed operations of the Contractor, premises owned, occupied or used by the Contractor, or automobiles owned, leased, hired or borrowed by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the District, its officers, officials, employees, volunteers, or agents.

b. Unless otherwise provided in paragraph "c" of this section, the Contractor's insurance coverage shall be primary insurance as respects the District, its officers, officials, employees, volunteers, and agents. Any insurance or self-insurance maintained by the District, its officers, officials, employees, volunteers, or agents shall be excess of the Contractor's insurance and shall not contribute with it.

c. As an acceptable alternative to provisions "a" and "b" of this section, the Contractor may provide owner's and contractor's protective liability insurance with coverage

limits, named insureds, and in conformity with all applicable specifications of this section.

d. Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the District, its officers, officials, employees, volunteers, or agents.

e. The Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

f. All Coverages — Each insurance policy required by this clause shall not be suspended, voided, canceled by either party, reduced in coverage, or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the District.

3.12.3 Best's Ratings

The District shall be the sole judge of whether or not said insurer's ratios are satisfactory. The District's decision shall be final and the District's bidding procedures contain no appeal provision.

1. Alphabetical Rating: For purposes of this Request for Bids, "insurer" shall mean any surety, insurance carrier, or other organization which proposes to provide an insurance policy or bond for the Contractor. No insurer or surety rated lower than "A-, Excellent" in the current *Best's Key Rating Guide* shall be acceptable to the District.

2. Financial Size Rating: Provided an insurer's alphabetical rating is satisfactory, the District will examine said insurer's financial size rating.

    a. If Best classifies the insurer XII or larger, said insurer shall be acceptable to the District.

    b. If Best classifies the insurer as smaller than XII, but larger than VI, said insurer shall be submitted to the District's Business Manager and/or the District's insurance consultant for review.

Financial Size ratings less than VII are not acceptable and will disqualify the Contractor.

3.12.4 Performance Bond and Labor & Materials Payment Bond Form

The Contractor shall provide a Performance Bond and Labor & Materials Payment Bond form acceptable to the District. The performance bond shall be for either 100% of the contract price or for the Contractor's unit price times the estimated number of units, as applicable.

This Request for Bids contains a Performance Bond and a Labor & Material Bond form for the Contractor's use.

If the Contractor fails to provide acceptable bonds within the specified time, he shall be in default.

3.12.5 Correction of Contractor's Insurance or Bond Deficiencies

If the District determines that the Contractor's insurance or bond documentation does not conform to these specifications, the District shall inform said Contractor of the non-conformity. If said Contractor fails to provide conforming insurance or bond documentation within five (5) calendar days of the District's deficiency notice, he shall be in default.

3.12.6 Indemnification Clause

Contractor shall protect, indemnify, hold and save harmless and defend the District, its officers, officials, employees, volunteers, and agents against any and all claims, costs, causes, actions and expenses, including but not limited to attorney's fees incurred by reason of a lawsuit or claim for compensation arising in favor of any person, including the employees, officers, independent contractors, or subcontractors of the Contractor or District, on account of personal injuries or death, or damages to property occurring, growing out of, incident to, or resulting directly or indirectly from the performance by the Contractor or subcontractor, whether such loss, damage, injury or liability is contributed to by the negligence of the District or by premises themselves or any equipment thereon whether latent or patent, or from other causes whatsoever, except that the successful bidder shall have no liability for damages or the costs incident thereto caused by the sole negligence of the District.

The indemnification shall not be limited by a limitation on amount or type of damages payable by or for the Contractor or its subcontractor under any employee benefits act including, but not limited, to the Workers Compensation Act.

No inspection by the District, its employees, or agents shall be deemed a waiver by the District of full compliance with the requirements of the Contract. This indemnification shall not be limited by the required minimum insurance coverages in the Contract.

3.13 Tax Exemption

The District is exempt, by law, from paying bidder Federal Excise Tax and Illinois Retailers' Occupational Tax. Therefore, the bidder shall exclude those taxes from his bid. The District's tax exemption number is E9992-3696-06. The bidder shall include all applicable taxes in his bid price.

Article 3 – Detailed Specifications

01010	Summary of Work
01330	Submittal Procedures
01500	Temporary Facilities
01700	Miscellaneous Requirements
02050	Demolition
03300	Cast-In-Place Concrete
05530	Grating
05550	Anchoring in Concrete
05990	Structural and Miscellaneous Metals
07900	Caulking and Sealants
08110	Hollow Metal Doors and Frames
08710	Door Hardware
09900	Painting
11000	Screens & Washer/Compactors Shop Drawings
15050	Basic Mechanical Materials and Methods
15140	Supports, Hangers & Sleeves
15190	Mechanical Identification
15410	Plumbing
15430	Plumbing Insulation
16060	Grounding and Bonding for Electrical Systems
16070	Hangers and Supports for Electrical Systems
16123	Building Wire and Cable
16128	Raceway and Boxes for Electrical System
16411	Enclosed Switches
16443	Motor Control Centers

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Contract description.
B. Owner supplied products.
C. Contractor's use of site and premises.
D. Work sequence.
E. Owner occupancy.
F. Specification Conventions.
G. Construction Work Narrative

1.2 CONTRACT DESCRIPTION

A. Work shall consist of:

1. Removal and replacement of the two (2) existing screens and two (2) screenings wash press (SWP) units, including appurtenances such as screenings piping, screen discharge chutes, and drainage piping. New screens and SWP equipment shall be provided by owner per the shop drawings included in these documents.

B. Substantial Completion (South Screen fully functional): Substantial Completion (South Screen) shall be March 11, 2019.

C. Substantial Completion (North Screen fully functional): Substantial Completion (North Screen) shall be April 22, 2019.

D. Final Completion: Final Completion shall be May 31, 2019.

1.3 OWNER SUPPLIED PRODUCTS

A. Equipment Supplied by Owner:

1. The Owner will supply two FSM Perforated Filter Screens, two screen control panels, two FSM Wash Presses (SWP), wash press discharge pipes, and updates to the existing wash press control panels, all as indicated in the shop drawings attached to these specifications or as specifically noted on the Contract Drawings.

2. The new equipment will be delivered to RRWRD's facility at 3333 Kishwaukee Street and shall be unloaded and stored on site by the Contractor.

1.4 CONTRACTOR'S USE OF SITE AND PREMISES

A. Access to Site is limited to 6:00 am to 4:00 pm, unless otherwise approved for limited durations on a case by case basis, and requires the Contractor to follow Owner's security measures as described in Section 01500. First shift operations are from 6:30 am to 3:00 pm and second shift from 2:30 pm to 11:00 pm. The Contractor will not be allowed on site between 4:00 pm and 6:30 am.

B. No work will be allowed on the weekends or holidays observed by Owner unless agreed upon by the Owner.

C. Construction Operations are limited to areas noted on Drawings.

D. Utility Outages and Shutdown: Coordinate all utility outages and shutdowns with the Owner at least forty-eight hours in advance, unless otherwise specified.

1.5 WORK SEQUENCE

A. Contractor shall schedule all work and materials to complete the project in a timely manner. Each screen and screenings washer / compactor replacement is critical to the plant operation and each must be returned to service as quickly as possible.

B. The project primarily requires the Contractor to remove the existing south screen and conveyor in order to install a new south screen and washer/compactor equipment. Once the south equipment is replaced, the Contractor will be required to remove the existing north screen and conveyor in order to install the new north screen and washer/compactor equipment. All materials must be onsite and demolition approved by the Owner prior to starting activity. The project also requires electrical upgrades, painting, water piping replacement, drain piping replacement, demolition, and concrete repair work.

C. The Contractor shall provide temporary electrical and control to allow the existing and new equipment to function during the transition from the existing screen control panel and its demolition to replacement with the new screen panels. Temporary power is required to the north equipment prior to demolition of the south equipment as the north power is routed through a junction box mounted to the south screen.

D. A detailed work sequence is included below. The Contractor may propose modifications to the work sequence, but must submit the modified work sequence to the District for approval prior to the start of any work. Failure to follow the

work sequence or secure approval of a modified sequence may invoke Liquidated Damages per the Agreement.

1.6 OWNER OCCUPANCY

A. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.

B. One screen and washer compactor shall be in service at all times during the project, except for pre-arranged and approved short duration outages (less than 1 hour). Schedule the Work to accommodate Owner occupancy and operation.

1.7 SPECIFICATION CONVENTIONS

A. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 CONSTRUCTION WORK NARRATIVE

This document summarizes the Screening Equipment Replacement project's general construction sequencing and requirements.

RRWRD pre-purchased the two screens, two screen control panels, two screenings chutes, two washer compactors, washer compactor screenings discharge piping, and new breakers for installation in the two existing washer compactor control panels. All other materials shall be provided by the Contractor.

This contract includes demolition of existing screening equipment and installation of the new equipment, all while one screen remains fully functional along with its associated washer compactor unit. Temporary facilities shall be included in the work as necessary to maintain operation of one screen at all times.

Contractor's project duties are summarized in the following paragraphs.

3.2 SOUTH SCREEN

Unload and temporarily store and protect the new equipment upon arrival at RRWRD.

The South Screen is in poor condition and shall be replaced first.

RRWRD will isolate the South Screen by closing the two slide gates. The Contractor shall provide pumping equipment to dewater the channel and provide sand bags as needed to minimize slide gate bypass flow into the screen channel.

Clean the South Screen Channel walls and floor, including grease build-up, debris, removal of old sample pump equipment, and removal of anchors.

Remove South Screen's anchors from the screen channel walls and floor. Cut and grind stainless steel anchors flush with the concrete surface. Carbon steel anchors shall be cut back ½" below the concrete surface and patched with non-shrink grout. All demolition work shall be performed in a manner to prevent debris from entering the screen channels and pump station wet well.

Remove the Wasco Skydome sky light from above the South Screen in a manner that will not distort or damage the sky light. Set on blocks for re-installation after the new South Screen is installed and protect from wind damage. Provide a removable temporary cover over the roof opening to minimize heat loss from the Upper Screen Room and to minimize precipitation from entering the Upper Screen Room.

Provide temporary conduit and wiring to the North Screening equipment and then disconnect and remove the South Screen power supplies, wash water supplies, and associated controls.

Disconnect and remove the South SWP power supplies, wash water supplies, and associated controls.

Dis-assemble the South Screen as necessary to remove from the structure. All demolition work shall be performed in a manner to prevent debris from entering the screen channels and pump station wet well.

Remove grating and checkered plate from the openings surrounding the Screen in the Upper Screen Room and as needed in the Lower Screen Room.

Provide steel plates as necessary to protect the 84" influent sewer and the pump station walls from crane loads while removing the screen. Remove the South Screen through the sky light roof opening. Remove grout from the Upper Screen Room floor.

The screen is not being salvaged for re-use and shall be hauled off site for disposal by the Contractor.

Remove the South SWP, wash water motor operated valves, and discharge pipes. Place on pallets and turn over to the RRWRD.

Remove the South SWP screenings chute, wash water piping, drain piping, and slide gate valves; dispose of the materials off site.

Fill the South SWP drain's floor hole with non-shrink grout, resultant from removal of the washer compactor's 3" drain pipe. Install anchors into existing concrete prior to grouting, to help keep the repair in place.

Remove the south washer compactor's concrete equipment pad and dispose of the materials off site. Cut reinforcing steel ½" below the floor surface and patch with grout. Anchors can remain if suitably located for the new SWP's equipment pad.

Temporarily install and support the new South Screen Panel in a location that will not interfere with future demolition/removal of the Old Screen Panel.

Provide and install four ¾" rigid galvanized steel conduits, one from the new MCC bucket, two from the Plant Control System panel, and one from the lighting panel near the PCS panel and all ending in the Utility Room (2 conduit are for the new screen panels and 2 are for the sample pump panel).

Install a new 12” dual breaker with cover in place of the 12” empty space immediately below the existing SWP dual breaker bucket in section 5 of MCC-14. Connect the new South Screen Panel to the new South Screen Panel feeder breaker.

Fabricate and install new stainless steel screen support frame as shown to span the floor opening between the existing Upper Screen Room floor beams for support of the new screen, using existing threaded anchors in the Upper Screen Room floor. Install in along with the new angle supports provided with the screen equipment.

Assemble as necessary and install the new South Screen through the sky light roof opening into the South Screen Channel. Level, anchor in place in the Upper Screen Room, grout, and anchor to the channel walls and floor as recommended by the screen manufacturer to secure the rubber seals.

Modify existing checkered plate structure on the effluent side of the new screen in the Lower Screen Room to fill new gaps. Install new grating on the influent side of the new screen to fill the smaller gap in the Lower Screen Room. Provide new aluminum grating as required to fill gaps on either side of the new screen in the Upper Screen Room, including support angles attached to the concrete opening. Secure all checkered plate and grating with removable hold downs, to prevent floating in the Lower Screen Room.

Install the new South SWP, screenings chute, water pipes, drain pipes with isolation slide gates and flushing valve connections, and screenings discharge piping. Provide a reinforced concrete equipment pad for the new SWP.

Modify the existing threaded rod pipe supports and provide new supports as needed in the Loading Area to accommodate the modified SWP screenings discharge pipe heights.

Provide new PVC coated rigid conduit in the Upper Screen Room as required for power and signals for all motors, wash water valves, equipment, and controls. New conduit is required from the new Screen Panels to the screens as indicated. The existing Utility Room conduit for the SWPs can be re-used but new conduit is required in the Upper Screen Room. Provide new disconnect switches, e-stops, supports, conduit, and wire for equipment in the Upper Screen Room.

Connect the new South Screen components to the new temporarily mounted South Screen Panel.

Replace the South SWP control panel breaker, as provided with the new screening equipment, in the existing South SWP control panel. Connect the new South SWP equipment to the existing control panel, including the drive motor and the wash water valve operators.

Provide conduit and wiring from the Plant Control System panel to the Utility Room sample pump control Panel.

Provide conduit and wiring from the lighting panel near the Plant Control System panel to the Utility Room control panel, for 120 volt sample pump power.

Remove sand bags from the South Screen Channel. RRWRD will open the South Screen Channel slide gates. Start-up and test the south screening equipment.

3.3 NORTH SCREEN

After 7 days of successful operation of the new South Screening Equipment, RRWRD will isolate the North Screen Channel by closing the two slide gates. The Contractor shall provide pumping equipment to

dewater the channel and provide sand bags as needed to minimize slide gate bypass flow into the screen channel. At some time, RRWRD might close the North Screen Channel slide gates during the one week South Screen test period to divert all flow to the one new screen.

Clean the North Screen Channel walls and floor, including grease build-up, debris, removal of old sample pump equipment, and removal of anchors.

Remove North Screen's anchors from the screen channel walls and floor. Cut and grind stainless steel anchors flush with the concrete surface. Carbon steel anchors shall be cut back ½" below the concrete surface and patched with non-shrink grout. All demolition work shall be performed in a manner to prevent debris from entering the screen channels and pump station wet wells.

Reinstall the South Sky Light and seal the sky light so water-tight.

Remove the sky light above the North Screen in a manner that will not distort or damage the sky light. Set on blocks on the roof for re-installation after the new North Screen is installed. Provide a removable temporary cover over roof opening to minimize heat loss from the Upper Screen Room and to minimize precipitation from entering the Upper Screen Room.

Disconnect and remove the North Screen power supplies, wash water supplies, and associated controls.

Disconnect and remove the North SWP power supplies, wash water supplies, and associated controls.

Dis-assemble the North Screen as necessary to remove from the structure. All demolition work shall be performed in a manner to prevent debris from entering the screen channels and pump station wet well.

Remove grating and checkered plate from the openings surrounding the North Screen in the Upper Screen Room and as needed in the Lower Screen Room.

Provide steel plates as necessary to protect the 84" influent sewer and the pump station walls from crane loads while removing the screen.

Remove the North Screen through the sky light roof opening. Remove grout and anchors from the Upper Screen Room floor. Clean the North Screen Channel.

The screen is not being salvaged for re-use and shall be hauled off site for disposal by the Contractor.

Remove the North SWP, wash water motor operated valves, and discharge pipes. Place on pallets and turn over to the RRWRD.

Remove the screenings chute, the associated wash water piping, drain piping, and slide gate valves; dispose of the materials off site.

Remove the North SWP's concrete equipment pad and dispose of the materials off site. Cut reinforcing steel ½" below the floor surface and patch with grout. Anchors can remain if suitably located for the new SWP's equipment pad.

Disconnect and remove the Old Screen Panel and the 1-1/2" electrical conduit from both the Sample Room and the Screen Room. Seal the wall openings with non-shrink grout. Plug the hole resulting from removal of 1-1/2" conduit in the junction box in the pump motor room near the ceiling.

Install the new North Screen Panel in its permanent location. Provide conduit and wiring from the new North Screen Panel Feeder Breaker to the new North Screen Panel.

Fabricate and install new stainless steel screen support frame as shown to span the floor opening between the existing Upper Screen Room floor beams for support of the new screen, using existing threaded anchors in the Upper Screen Room floor. Install in along with the new angle supports provided with the screen equipment.

Install the new North Screen through the sky light roof opening into the North Screen Channel. Level, anchor in place in the Upper Screen Room, grout, and anchor to the channel walls and floor as recommended by the screen manufacturer to secure the rubber seals.

Modify existing checkered plate structure on the effluent side of the new screen in the Lower Screen Room to fill new gaps. Install new grating on the influent side of the new screen to fill the smaller gap in the Lower Screen Room. Provide new aluminum grating as required to fill gaps on either side of the new screen in the Upper Screen Room, including support angles attached to the concrete opening. Secure all checkered plate and grating with removable hold downs, to prevent floating in the Lower Screen Room.

Install the North Washer Compactor, screenings chute, water pipes, drain pipes with isolation slide gates and flushing valve connections, and screenings discharge piping. Provide a reinforced concrete equipment pad for the new SWP.

Modify the existing threaded rod pipe supports and provide new supports as needed in the Loading Area to accommodate the modified SWP screenings discharge pipe heights.

Provide new PVC coated rigid conduit in the Upper Screen Room as required for power and signals for all motors, wash water valves, equipment, and controls. New conduit is required from the new Screen Panels to the screens as indicated. The existing Utility Room conduit for the SWPs can be re-used but new conduit is required in the Upper Screen Room. Provide new disconnect switches, e-stops, supports, conduit, and wire for equipment in the Upper Screen Room.

Connect the new North Screen components to the new North Screen Panel.

Replace the North SWP control panel breaker, as provided with the new screening equipment, in the existing North SWP control panel. Connect the new North SWP equipment to the existing control panel, including the drive motor and the wash water valve operators.

Reinstall the North Sky Light and seal the sky light so water-tight.

Remove sand bags from the North Screen Channel. RRWRD will open the North Screen Channel slide gates.

Start-up and test the north screening equipment for 7 days.

After the new North screening equipment passes the 7 day test, temporarily shut down the South Screen. Relocate the temporarily installed South Screen Panel to its permanent location on the Utility Room's north wall. Provide conduit and wiring as necessary to make the permanent installation for the new South Screen Panel.

Restart the South Screen and test all functions.

3.4 MISCELLANEOUS ITEMS

Install Type 316 stainless steel threaded shouldered eyebolts in the reinforced concrete beam above each sample pump's checkered plate opening downstream of each screen. Provide embedment of 6" into the concrete with Hilti HIT-RE 500 V3 adhesive. The two lifting eyes shall each be rated for 2,000+/- pound in-line capacity and shall have a 1 inch inside eye diameter.

Install new sample pump discharge piping and valves as indicated for each of the two sample pump locations, so piping is not supported off the existing screens.

Remove and replace the water piping in the Lower Screen Room as indicated on the drawings and as specified. Most of the existing piping is copper and will be replaced with Schedule 80 PVC piping materials and stainless steel ball valves. Provide temporary water supply to critical features or schedule the work so down times are agreeable to RRWRD and function of Main Pump Station. Modify pipe supports and install new as necessary to accommodate the new piping materials. The Lower Screen Room spray headers, 2 for each screen, shall be removed but will not be replaced.

Remove and replace the drain and vent piping in the Lower Screen Room as indicated on the drawings and as specified. Majority of the existing piping is cast iron and will be replaced with Schedule 40 PVC materials. Modify pipe supports and install new as necessary to accommodate the new piping materials. This task also includes replacement of 3 existing 6" floor drains in the Upper Screen Room, as indicated.

Remove the following additional items from the Lower Screen Room:

South wall door frame at the stairwell.
Sample booster pump, piping, wiring, and conduit.
Two 18"x18"(+/-) CS plates over the wet wells.
One fiberglass pushbutton station box on the southeast wall, one fiberglass junction box on the South Screen effluent gate frame, and the 1" conduit and supports between the two FRP boxes.

Perform the following items in the Lower Screen Room:

Clean and paint the walls and ceiling in the Lower Screen Room and up both stairwells to the height of the Lower Screen Room ceiling. Paint shall be dark gray on the lower 4 feet of the walls and white on the remaining portion of the walls and ceiling.

Clean and paint the walls and ceiling in the Upper Screen Room. Paint shall be dark gray on the lower 4 feet of the walls and white on the remaining portion of the walls and ceiling.

Clean and paint the walls and ceiling in the Loading Area. Paint shall be dark gray on the lower 4 feet of the walls and white on the remaining portion of the walls and ceiling.

Clean and paint the walls and ceiling in the Utility Room. Paint shall be dark gray on the lower 4 feet of the walls and white on the remaining portion of the walls and ceiling.

END OF SECTION

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
1. Submittal procedures.
2. Construction progress schedules.
3. Product data.
4. Shop drawings.
5. Samples.
6. Design data.
7. Test reports.
8. Certificates.
9. Manufacturer's instructions.
10. Manufacturer's field reports.
11. Erection drawings.
12. Construction photographs.

1.2 SUBMITTAL PROCEDURES

A. The Contractor shall submit for approval detailed shop drawings of all equipment and materials. No material or equipment shall be delivered to the job site or installed until the Contractor has in his possession the approved shop drawings for that particular material or equipment.
1. The shop drawings shall be completed as described in individual specification Section.
2. The Contractor shall furnish submittals electronically except where too large to transmit in which case 3 paper copies shall be submitted. Electronic submittals shall be allowed with the requirement that two (2) paper copies and one (1) electronic copy of the final version be submitted before substantial completion.

B. Transmit each submittal with a letter of transmittal listing the following information in a clear and legible fashion:
1. Project name
2. Date
3. Name and address of Contractor
4. Name and address of supplier, as appropriate
5. Name of manufacturer, as appropriate
6. Number and title of appropriate specification section
7. Drawing number and detail references, as appropriate
8. Similar definitive information as necessary

C. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.

D. Identify Project, Contractor, subcontractor and supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.

E. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents.

F. Prior to delivery of any material to the job site, and sufficiently in advance of requirements to allow Owner ample time for checking, submit for approval detailed, dimensioned drawings or cuts, showing construction, size, arrangement, operating clearances, performance characteristics and capacity. Each item of equipment proposed shall be a standard catalog product of an established manufacturer and of equal quality, finish, and durability to that specified.

1. For each submittal for review, allow fourteen (14) calendar days excluding delivery time to and from Contractor.
2. Failure of the Contractor to submit shop drawings in ample time for checking shall not entitle him to an extension of contract time, and no claim for extension by reason of such default will be allowed.

G. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.

H. Allow space on submittals for Contractor and Owner review stamps.

I. When revised for resubmission, identify changes made since previous submission.

J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

K. Submittals not required will not be recognized or processed.

1.3 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial schedules within fifteen (15) calendar days after Notice to Proceed. If re-submittals are necessary, resubmit required revised data within ten (10) calendar days following receipt of comments.

B. Submit revised Progress Schedules during progress meetings, when necessary to indicate any perceived change in the project.

C. Distribute copies of revised schedules to Project site file, subcontractors, suppliers, and other concerned parties.

D. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

E. Submit a schedule detailing each major portion of Work or operation as it pertains to each Phase of Work, identifying first work day of each week.

F. Indicate early and late start, early and late finish, float dates, and duration.

G. Indicate estimated percentage of completion for each item of Work at each submission.

H. Submit separate schedule of submittal dates for shop drawings, product data, and samples, and dates reviewed submittals will be required from Owner

I. Indicate delivery dates for Owner furnished products.

J. Revisions to Schedules:
   1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
   2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
   3. Prepare narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed corrective plan and its effect, including effect of changes on schedules of separate contractors.

1.4 PRODUCT DATA

A. Product Data: Submit to Owner for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Submit number of copies Contractor requires, plus three (3) copies Owner will retain. Electronic submittals shall be allowed with the requirement that two (2) paper copies and one (1) electronic copy of the final versions be submitted before substantial completion.

C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

E. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01700.

1.5 SHOP DRAWINGS

A. Shop Drawings: Submit to Owner for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Submit number of reproductions Contractor requires, plus three (3) copies Owner will retain. Electronic submittals shall be allowed with the requirement that two (2) paper copies and one (1) electronic copy of the final versions be submitted before substantial completion.

D. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01700.

1.6 SAMPLES

A. Samples: Submit to Owner for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Samples For Selection as Specified in Product Sections:
   1. Submit to Engineer for aesthetic, color, or finish selection.
   2. Submit samples of finishes from full range of manufacturers' standard colors, textures, and patterns for Owner selection.

C. Submit samples to illustrate functional and aesthetic characteristics of Products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

D. Include identification on each sample, with full Project information.

E. Submit number of samples specified in individual specification sections; Owner will retain one (1) sample.

F. Reviewed samples which may be used in the Work are indicated in individual specification sections.

G. Samples will not be used for testing purposes unless specifically stated in specification section.

1.7 DESIGN DATA

A. Submit for Owner’s knowledge.

B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.8 TEST REPORTS

A. Submit for Owner's knowledge.

B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.9 CERTIFICATES

A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Owner.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Owner.

1.10 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Owner in quantities specified for Product Data.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.11 MANUFACTURER'S FIELD REPORTS

A. Submit reports for Owner’s benefit.

B. Submit report in duplicate within thirty (30) calendar days of observation to Owner for information.

C. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.12 ERECTION DRAWINGS

A. Submit drawings for Owner's benefit.

B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

C. Data indicating inappropriate or unacceptable Work may be subject to action by Owner.

1.13 CONSTRUCTION PHOTOGRAPHS

A. Contractor shall photograph work activities to provide a general documentation of the work progression and work results. At a minimum, the Contractor shall photographically document the main schedule activities and photograph at least monthly throughout the project duration.

B. Deliver one print copy and electronic files to Owner with project record documents. Catalog and index print and electronic files in chronological sequence; include typed table of contents.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities:
1. Temporary electricity.
2. Temporary lighting for construction purposes.
3. Temporary ventilation.
4. Temporary water service.
5. Temporary sanitary facilities.

B. Construction Facilities:
1. Field offices and sheds.
2. Vehicular access.
3. Parking.
4. Progress cleaning and waste removal.

C. Removal of utilities and facilities.

1.2 TEMPORARY ELECTRICITY

A. Miscellaneous power will be made available to the Contractor by Owner at no cost to the Contractor, subject to the following conditions:
1. Existing lighting systems may be utilized by Contractor to the extent available. Any necessary additional or temporary lighting systems shall be provided by Contractor at no additional cost to Owner.
2. Power will be available at 120 Volts, 60 Hz, single phase at convenience receptacles. No 480 volt power will be available.
3. Electrical power shall be used only in such quantities as will not interfere with Owner's requirements, and care shall be taken not to overload the existing facilities. Contractor shall provide any additional or temporary electrical power or power of other voltages it may require for prosecution of the Work.
4. If the Contractor has a site trailer or requires 480 volt power for other purposes, the Contractor shall provide a meter and pay RRWRD for power used.

B. These provisions shall not be construed as a guarantee by Owner of the uninterrupted continuation of power, and interruptions shall not be reason for claims for additional costs nor for extensions of time. Contractor shall provide, at no additional cost to Owner, any necessary power required for prosecution of the Work during such interruptions.

1.3 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Provide and maintain lighting for construction operations as necessary.

1.4 TEMPORARY VENTILATION

A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases as necessary during construction. The Screen Rooms and Loading Area are Class 1 Division II Group D rated hazardous environments. Contractor shall take all precautions necessary to protect the facility and its workers.

B. Contractor to replace existing HVAC filters if Contractor operations create dust in the indoor spaces.

1.5 TEMPORARY WATER SERVICE

A. Limited water is available and will be shut off if abused. Contractor shall exercise measures to conserve energy.

B. Utilize Owner's existing water system, extend and supplement with temporary devices as needed to maintain specified conditions for construction operations.

C. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing, when applicable.

1.6 TEMPORARY SANITARY FACILITIES

A. Provide and maintain portable toilet and wash facilities with outdoor enclosures. Existing RRWRD facility use is not permitted. Provide facilities at time of project mobilization and maintain throughout the project.

1.7 FIELD OFFICES AND SHEDS

A. Construction: Provide portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations with steps and landings at entrance doors as determined necessary by Contractor during construction operations.

B. Storage Areas and Sheds: Size storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and for inspection of products.

1.8 VEHICULAR ACCESS

A. Use designated, existing on-site roads for construction traffic.

1.9 PARKING

A. Locate in designated staging area as approved by Owner.

B. Use of designated areas of existing parking facilities is not permitted by construction personnel, unless approved by Owner. Obstruction of Owner parking by Contractor vehicles is not permitted.

C. Do not allow heavy vehicles or construction equipment in parking areas.

1.10 PROGRESS CLEANING AND WASTE REMOVAL

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing spaces.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and rubbish from site on a daily basis and dispose off-site.

E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

F. The Owner’s screenings dumpsters shall be used for screenings only. Dumping of any other waste materials in these dumpster shall require the Contractor to pay for the disposal costs and environmental clean-up costs for all materials in the dumpsters.

1.11 REMOVAL OF TEMPORARY UTILITIES, AND FACILITIES

A. Remove temporary utilities, equipment, facilities, and materials prior to Final Application for Payment inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing and permanent facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01700

MISCELLANEOUS REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
1. Summary
2. Closeout procedures.
3. Final cleaning.
4. Starting of systems.
5. Demonstration and instructions.
6. Testing, adjusting, and balancing.
7. Protecting installed construction.
8. Project record documents.
9. Operation and maintenance data.
10. Spare parts and maintenance products.
11. Product warranties and product bonds.

1.2 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.

B. Provide close out document submittals to Owner as required per Section 01330.

C. Submit final Application for Payment.

1.3 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Clean equipment and fixtures with cleaning materials appropriate to surface and material being cleaned.

C. Clean work site; sweep floors and paved areas.

D. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.4 STARTING OF SYSTEMS

A. Contractor shall initially start-up and place all equipment installed by Contractor into successful operation according to manufacturers' written instructions and as instructed by manufacturers' representatives.

B. Provide all materials, labor, tools, equipment, and expendables required.

C. Coordinate schedule for start-up of various equipment and systems. Notify Owner seven (7) calendar days prior to start-up of each item. The Owner's Representative shall be present during start-up.

D. Execute start-up under supervision of responsible manufacturer's representative in accordance with manufacturer's instructions.

E. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

F. Submit a written report in accordance with Section 01330 that equipment or system has been properly installed and is functioning correctly.

G. General pre-start-up actives include, but are not limited to the following:
   1. Cleaning.
   2. Removing temporary protective coverings.
   3. Flushing and replacing greases and lubricants, where required by manufacturer.
   4. Check and set motor, pump and other equipment, drive rotation, belt tension, control sequence, and safety interlocks.
   5. Check and correct, if necessary, leveling plates, grout, bearing plates, anchor bolts, fasteners, and alignment of piping which may put stress on equipment connected to it.
   6. Verify meter readings and specified electrical characteristics agree with those required by equipment or system manufacturer.
   7. Verify wiring and support components for equipment are complete and tested.
   8. Test all equipment and systems at normal operating conditions and through the normal operating range.

H. Minimum Start-Up Procedures:
   1. Motors: Measure amperage of each motor and compare to nameplate value. Correction conditions which produce excessive current flow and which exist due to equipment malfunction.
   2. Pumps: Check glands and seals for cleanliness and adjustment before operating pump. Inspect shaft sleeves for scoring. Inspect mechanical

faces, chambers, and seal rings, replacing them if defective. Verify that piping system is free of debris before circulating liquid through pump.

3. Valves: Inspect all valves, clean bonnets and stems. Inspect packing glands to assure no leakage and tighten or replace as necessary. Verify that control valve seats are free from foreign material and are properly positioned for service.
4. Pipe Joints: Inspect all joints for leakage, and tighten, remake, or replace as necessary.
5. Pipe Supports: Inspect all piping supports to assure adequate restraint to prevent displacement, vibration, or failure of piping and fittings, while allowing for expansion and contraction. Modify and adjust as necessary.
6. Electrical Circuits: Check each electrical control circuit to assure operation complies with Specifications and requirements to provide desired performance.
7. Instruments: Test, adjust, and calibrate as required.

1.5 DEMONSTRATION AND INSTRUCTIONS

A. Prior to final inspection, demonstrate operation of each system to Owner. A 7 day operational test of the complete system is required.

B. Instruct Owner’s personnel in operation, adjustment, and maintenance of equipment and systems, using the operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

1. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at a scheduled time.
2. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
3. Provide adequate instruction time for each item of equipment and system.

1.6 TESTING, ADJUSTING, AND BALANCING

A. Contractor will appoint, employ, and pay for services of independent firm to perform testing, adjusting, and balancing where necessary.

B. Reports will be submitted by independent firm to Owner indicating observations and results of tests and indicating compliance or non-compliance with requirements of Contract Documents.

1.7 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

C. Provide protective coverings at walls, jambs, sills, and soffits of openings.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

F. Prohibit traffic on landscaped areas.

1.8 PROJECT RECORD DOCUMENTS

A. Maintain on site one (1) set of the following record documents and record actual revisions to the Work as the project progresses:
1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed Shop Drawings, Product Data, and Samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress, not less than weekly.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured depths of foundations in relation to finish floor datum.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
4. Field changes of dimension and detail.
5. Details not on original Contract drawings.

G. Submit documents to Owner prior to final Application for Payment.

1.9 OPERATION AND MAINTENANCE DATA

A. Submit data bound in 8-1/2 x 11 inch text pages, three-ring binders with durable plastic covers. The Owner requires a single O&M manual for the entire project, or if required, multiple volumes of binders number sequentially for the project.

B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.

C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

D. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

E. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
      f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   3. Part 3: Project documents and certificates, including the following:
      a. Shop drawings and product data.
      b. Air and water balance reports.
      c. Certificates.
      d. Originals of warranties and bonds.

F. Manual for Materials and Finishes
   1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten (10) calendar days after acceptance.

2. Submit one (1) copy of completed volumes fifteen (15) calendar days prior to final inspection. Draft copy shall be reviewed and returned after final inspection with Owner comments. Revise content of document sets as required prior to final submission.
3. Submit three (3) sets of revised final volumes in final form within ten (10) calendar days after final inspection and submit 1 electronic version of the final document.
4. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Include information for re-ordering custom manufactured products.
5. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
6. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.
7. Include listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

G. Manual for Equipment and Systems
1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten (10) calendar days after acceptance.
2. Submit one (1) copy of completed volumes fifteen (15) calendar days prior to final inspection. Draft copy shall be reviewed and returned after final inspection with Owner comments. Revise content of document sets as required prior to final submission.
3. Submit three (3) sets of revised final volumes in final form within ten (10) calendar days after final inspection and submit 1 electronic version of the final document.
4. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.
5. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed. Include color coded wiring diagrams as installed. Include control diagrams by controls manufacturer as installed.
6. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and special operating instructions.

7. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
8. Include servicing and lubrication schedule, and list of lubricants required.
9. Include manufacturer's printed operation and maintenance instructions.
10. Include sequence of operation by controls manufacturer.
11. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
12. Include Contractor's coordination drawings, with color coded piping diagrams as installed. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
13. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
14. Additional Requirements: As specified in individual product specification sections.
15. Include listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

1.10 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Furnish spare parts, maintenance, and extra products in quantities specified in individual specification sections.

B. Deliver to Project site and place in location as directed by Owner; provide transmittal form with each delivery.

1.11 PRODUCT WARRANTIES AND PRODUCT BONDS

A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten (10) calendar days after completion of applicable item of work.

B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.

C. Verify documents are in proper form, contain full information, and are notarized.

D. Co-execute submittals when required.

E. Include Table of Contents and assemble in three D-ring binder with durable cover.

F. Submit prior to final Application for Payment.

G. Time of Submittals:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten (10) calendar days after acceptance.
2. Make other submittals within ten (10) calendar days after Date of Substantial Completion, prior to final Application for Payment.
3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten (10) calendar days after acceptance, listing date of acceptance as beginning of warranty or bond period.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 02050

DEMOLITION

PART 1–GENERAL

1.01 SUMMARY

A. Work Includes all demolition, removal, and salvage as shown on the drawings or specified.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 SUBMITTALS

A. CONTRACTOR shall submit hot work procedures.

1.03 QUALITY ASSURANCE

A. CONTRACTOR shall perform demolition, removal, and salvage in conformity with applicable federal, state, and local safety practices and code requirements.

B. CONTRACTOR shall contact all public utilities and shall shut off, cut, and cap all utility services in accordance with utility requirements, codes, rules, and regulations.

C. Obtain and pay for all necessary permits, licenses and certificates required.

1.04 SEQUENCE

A. No demolition, removal, or salvage work shall commence until approval to proceed has been granted by OWNER. Such work shall be completed in accordance with the construction sequence included in Division 1 of these specifications and in accordance with the construction phases of the project and work to be done by other contractors.

PART 2–PRODUCTS

2.01 GENERAL

A. Pipe fittings and materials shall meet the requirements of Section 15410- Plumbing Piping.

PART 3–EXECUTION

3.01 ABANDONING AND REMOVING UTILITIES AND UNDERGROUND PROCESS PIPING

A. CONTRACTOR shall be responsible for the turning off or unhooking of all utilities and process piping before starting the demolition work. Remove all utility lines, including electrical services and process piping that are shown or specified to be removed. Remove utility lines that are to be abandoned as needed to clear new construction.

3.02 EQUIPMENT

A. CONTRACTOR shall remove all equipment specified herein or indicated.

B. CONTRACTOR shall remove associated exposed conduit, power wiring, controls, switches, instrumentation, control wiring, control boxes, appurtenances, and their supports serving equipment to be removed. Electrical items shall be removed to their junction with motor control center, control panel, or their junction with conduit serving other equipment that is to remain.

C. CONTRACTOR shall remove all piping and appurtenances and their supports serving equipment indicated to be removed. Piping shall be removed to its junction with the main service header serving other equipment that is to remain or new equipment as indicated. Remaining piping and tubing shall be fitted with an appropriate blind flange or plug and insulated as required.

D. CONTRACTOR shall remove equipment bases, anchor bolts, and other supports serving equipment to be removed. Concrete bases and their anchors shall be removed to 1/2 inch below floor elevation and repaired with non-shrink grout plus surfacing to match existing.

E. CONTRACTOR shall patch floors, walls, and ceilings as required to match existing or as indicated where equipment, piping, electrical, bases, or supports are removed.

F. CONTRACTOR shall remove the following major equipment items or systems. The following list is not intended to be all-inclusive. CONTRACTOR shall remove all items indicated or specified to be removed.
   1. Parkson Aqua Guard Screens and appurtenances.
   2. Screen Control Panel and concrete pad.
   3. Enviro-Care Screenings Washer Compactors, discharge pipes, and concrete pads.
   4. Aluminum platform west of screens.
   5. Lower Screen Room plant water piping, as indicated.
   6. Lower Screen Room drain and vent piping, as indicated.
   7. Conduit and wiring, as indicated.

3.03 INTERIOR PIPING, DUCTWORK,AND APPURTENANCES

A. CONTRACTOR shall remove all piping, ductwork, and appurtenances as indicated. The location and elevations of existing piping are approximate.

B. CONTRACTOR shall remove all supports for piping, ductwork, and appurtenances indicated to be removed. Re-piping and connections to new piping shall be as specified for new piping. Remaining piping and tubing, not reconnected for new piping, shall be fitted with an appropriate blind flange or plugged and insulated as required.

C. CONTRACTOR shall patch all holes resulting from removal of piping, ductwork, appurtenances, and their supports. Patching of concrete shall be with non-shrink grout and as indicated. Patching of masonry shall be with matching material toothed in. Patch other material as indicated.

3.04 SALVAGE

A. OWNER has first right of refusal to all material, piping, and equipment removed.

B. All equipment, material, and piping, except as specified hereinafter, within the buildings and structures to be demolished and additional items as noted shall be removed by CONTRACTOR. CONTRACTOR shall inspect each structure and determine the type and amount of equipment, materials, and piping to be removed.

C. All equipment, material, and piping, except as specified hereinafter, within the limits of the demolition and additional items noted to be removed, will become the property of CONTRACTOR if OWNER does not claim under first right of refusal and shall be removed from the project site. Comply with State and local ordinances and regulations for disposing of materials.

D. The following equipment and materials shall be removed and reused in the new facilities:
   1. Lower Screen Room effluent side Screen Channel cover plates, modified to fit new screening equipment.
   2.

E. The following equipment and materials shall be removed and turned over to OWNER:
   1. Two Enviro-Care Screenings Washer Compactors, complete with discharge pipes, motor operated valves, and disconnect switches.
   2. Submersible sample pump.
   3.

F. If CONTRACTOR chooses to dispose of materials in a Clean Construction or Demolition Debris (CCDD) fill operation, CONTRACTOR shall provide all required testing, certifications, and fees associated with using the CCDD fill operation.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SCOPE:

A. This section covers all cast-in-place concrete and grout, including reinforcing steel, forms, finishing, curing, and appurtenant work.

1.02 SUBMITTALS:

A. All submittals of drawings and mix data shall be in accordance with the Submittals Procedures section.

B. Reports covering the source and quality of concrete materials and the concrete proportions proposed for the work shall be submitted to Engineer for review before any concrete is placed.

PART 2 - PRODUCTS

2.01 LIMITING REQUIREMENTS:

A. Unless otherwise specified, concrete shall be controlled within the following limiting requirements:

Cement Content	At least 564 lbs per cubic yard.
Maximum Water-Cement Ratio	The maximum water-cement ratio shall be 0.42 on a weight basis, or, if fly ash is used, the combined mass of cement plus fly ash shall be used to determine the water-cementitious materials ratio.
Fly Ash Content	At the option of Contractor, fly ash may be substituted for up to 25 percent of the Portland cement, on the basis of 1.0 lbs of fly ash added for each lb of cement reduction.
Coarse Aggregate	Maximum nominal coarse aggregate size, 1 inch.
Consistency	Workable, without segregation, with slump not

	more than 4 inches when concrete is placed.
Mixing	In accordance with ASTM C94.

B. Slump: Concrete slump shall be kept as low as possible consistent with proper handling and thorough compaction. Unless otherwise authorized by Engineer, slump of concrete without a super-plasticizer shall not exceed 4 inches. Slump of concrete with a super-plasticizer, or a midrange water reducer, shall not exceed 8 inches.

C. Total Air Content. The total volumetric air content of concrete after placement shall be 6 percent ±1.5 percent. Air-entraining admixture may be omitted from concrete for interior slabs which are to be trowel finished.

D. Admixtures. The admixture content, batching method, and time of introduction to the mix shall be in accordance with the manufacturer's recommendations and acceptable to Engineer. A water-reducing admixture and an air-entraining admixture shall be included in all concrete. A midrange water reducer or a super-plasticizer may be used at Contractor's option. No calcium chloride or admixture containing chloride from sources other than impurities in admixture ingredients will be acceptable.

E. Strength. The minimum acceptable compressive strengths, as determined by ASTM C39, shall be:

Age	Minimum Compressive Strength
7 days	3,375 psi
28 days	4,500 psi

Cylinders shall be 6 inches diameter by 12 inches high for concrete mixes using a maximum nominal aggregate size of 1 inch or larger. Cylinders may be either 6 inches diameter by 12 inches high, or 4 inches diameter by 8 inches high for concrete mixes using a maximum nominal aggregate size of less than 1 inch. The average compressive strength shall be determined from the results of at least three cylinder breaks when using 4 inch diameter cylinders, and at least two cylinder breaks when using 6 inch diameter cylinders. All tests shall be performed using the same sized cylinders for the duration of the work.

2.02 MATERIALS:

Cement	ASTM C150, Type II or Type I/II, low alkali.
Fly Ash	ASTM C618, Class F or Class C, except loss on ignition shall not exceed 4 percent.
Fine Aggregate	Non-reactive, clean, natural sand, ASTM C33.
Coarse Aggregate	Non-reactive crushed rock, washed gravel, or other inert granular material conforming to ASTM C33, class 4S, except that clay and shale particles shall not exceed 1 percent.
Water	Potable.
Admixtures	
Water-Reducing	ASTM C494, Type A or D.
Air-Entraining	ASTM C260.
Super-plasticizing	ASTM C494, Type F or G.
Reinforcing Steel	
Bars	ASTM A615, Grade 60, deformed.
Welded Wire Fabric	ASTM A185 or A497.
Bar Supports	CRSI Class 1, plastic protected; or Class 2, stainless steel protected.
Mechanical Connector (Couplers or Form Savers)	Classified Type 2 per ACI 318. Use only where indicated on the drawings.
Expandable Waterstops, permitted only at locations indicated on Drawings	Hydrophilic; bentonite free, chemically modified rubber. Adeka “Ultra Seal MC-2010MN” or Greenstreak “Hydrotite CJ-1020-2K”. Adhesive as recommended by the manufacturer.
Sealant for expandable waterstop	Adeka “Ultra Seal P-201” or Greenstreak “Leakmaster”.

Expansion Joint Material	Sponge rubber expansion joint material, ASTM D1752 Type I, as indicated on the drawings.
FORMS:	
Plywood Product	Standard PS1, waterproof, resin-bonded, exterior type, Douglas fir.
Lumber	Straight, uniform width and thickness, and free from knots, offsets, holes, dents, and other surface defects.
Form Coating	Nonstaining and nontoxic after 30 days. Product shall not exceed VOC limits established by the federal, state, or local regulatory agency having jurisdiction over the project site.
Evaporation Reducer	Dayton Superior “AquaFilm Concentrate J74”, Euclid "Eucobar", L&M Chemical "E-Con", BASF "Confilm", or Sika "SikaFilm".
Membrane Curing Compound and Floor Sealer	ASTM C1315, Type I, Class A, minimum 25 percent solids, acrylic, non-yellowing, unit moisture loss 0.40 kg/m^2 maximum in 72 hours. Product shall not exceed VOC limits established by the federal, state, or local regulatory agency having jurisdiction over the project site.
Polyethylene Film	Product Standard PS17 or ASTM D4397, 6 mils or thicker.

2.03 FORMS:

A. Forms shall be designed to produce hardened concrete having the shape, lines, and dimensions indicated on the drawings. Forms shall be substantial and sufficiently tight to prevent leakage of mortar and shall be maintained in proper position and accurate alignment. Forms shall be thoroughly cleaned and coated before concrete is placed and shall not be removed until the concrete has attained sufficient strength to safely support all loads without damage.

2.04 REINFORCEMENT:

A. Reinforcement shall be accurately formed and positioned, and shall be maintained in proper position while the concrete is being placed and compacted. Reinforcement shall be free from dirt, loose rust, scale, and contaminants. Mechanical connectors shall not be used.

2.05 NON-SHRINK GROUT

A. Grout for concrete repair and patching shall be one of the following materials to suite the application.
   a. Master Emaco by Master Builders
   b. EucoRepair by Euclid Chemical

B. Mixing and placement shall be in accordance with the product manufacturer's recommendations.

PART 3 - EXECUTION

3.01 PLACEMENT:

A. Concrete shall be conveyed to the point of final deposit and placed by methods which will prevent segregation or loss of the ingredients. During and immediately after placement, concrete shall be thoroughly compacted and worked around all reinforcement and embedments and into the corners of the forms. Unless otherwise authorized, compaction shall be by immersion-type vibrators. The use of "jitterbug" tampers to compact concrete flatwork will not be permitted.

B. Polyethylene Film. Where concrete is placed against gravel or crushed rock which does not contain at least 25 percent material passing a No. 4 sieve, such surfaces shall be covered with polyethylene film. Joints in the film shall be lapped at least 4 inches and taped.

3.02 WATER STOPS:

A. Each water stop shall be continuous throughout the length of the joint in which it is installed. Water stops shall be clean, free from coatings, and shall be maintained in proper position until surrounding concrete has been deposited and compacted.

3.03 FINISHING:

A. Fins and other surface projections shall be removed from all formed surfaces, except exterior surfaces that will be in contact with earth backfill. Surface voids and recesses resulting from removal of form ties shall be filled with mortar. Unless

otherwise specified, unformed surfaces shall be given a float finish and deck surfaces shall be broom finished for texture.

B. Application of Evaporation Reducer.
   1. Concrete flatwork subject to rapid evaporation due to hot weather, drying winds, and sunlight may be protected with an evaporation reducer. The evaporation reducer shall form a continuous film on the surface of fresh, plastic concrete to reduce evaporation.
   2. Immediately following screeding, evaporation reducer shall be sprayed over the entire surface of fresh, plastic concrete flatwork at a rate of not less than 200 square feet per gallon, in accordance with the manufacturer's recommendations. The spray equipment shall have sufficient capacity to continuously spray the product at approximately 40 psi with a suitable nozzle as recommended by the manufacturer.
   3. The sprayable solution shall be prepared as recommended by the manufacturer.
   4. Under severe drying conditions, additional applications of evaporation reducer may be required following each floating or troweling, except the last finishing operation.

3.04 CURING:

A. Concrete shall be protected from loss of moisture for at least 7 days by membrane curing or by water curing. Membrane curing compound shall be applied as recommended by the manufacturer. Water curing shall be in accordance with ACI 308.1.

B. Keep concrete moist and at an average daily temperature of at least 50 degrees Fahrenheit, for at least 7 days following placement. If hourly temperature is allowed to drop below 50 degrees Fahrenheit during the 7 days after placement, the cure time shall be extended to compensate for the cold and shall be per the Engineer’s request.

3.05 COLD WEATHER CONCRETING:

A. Concrete work during cold weather shall be in accordance with the recommendations of ACI 306R and as indicated herein.

B. Submit a cold weather concreting plan for approval. The plan shall address all aspects of the process including batch plant activities, delivery, placement, curing, freeze protection, temperature monitoring, and recording of data.

C. Subgrade and steel shall be heated to at least 40 degrees Fahrenheit and maintained at this temperature until arrival of concrete. Placement over frozen subgrade is not acceptable.

D. Heat water and aggregate at the batch plant so concrete arrives on site at least at 55 degrees Fahrenheit.

E. Accelerating admixtures are not acceptable.

F. Maintain surface of fresh concrete above 50 degrees Fahrenheit for at least 7 days.

G. Contractor shall record temperatures of concrete off the truck and at multiple locations on each pour. Record temperatures first thing in the morning, at noon, and at end of the work day during the first 10 days after pouring. Recording on weekends and holidays is not required. Keep records and submit to Engineer within 14 days of concrete placement.

3.06 HOT WEATHER CONCRETING:

A. Concrete work during hot weather shall be in accordance with the recommendations of ACI 305R and as indicated herein.

B. Submit a hot weather concreting plan for approval. The plan shall address all aspects of the process including batch plant activities, delivery, placement, and curing.

C. Cool surfaces of subgrade and reinforcing steel and inserts to approximately 90 degrees Fahrenheit prior to concrete placement. Provide shelter as necessary to shade the concrete area from direct sun and wind.

D. Temperature of delivered concrete shall not exceed 90 degrees Fahrenheit. Water addition to the mix on site for cooling purposes is not an acceptable method of cooling the mix.

E. Keep placed concrete continuously moist for at least 24 hours following placement. Follow curing procedures.

3.07 REPAIRING DEFECTIVE CONCRETE:

A. Defects in concrete surfaces shall be repaired to the satisfaction of Engineer. All concrete which is honeycombed or otherwise defective shall be cut out and removed to sound concrete, with edges cut square to avoid feathering.

B. Concrete repair work shall conform to Article 5.3.7 of ACI 301 and shall be performed in a manner that will not interfere with thorough curing of surrounding concrete. Repair work shall be adequately cured.

3.08 FIELD CONTROL TESTING:

A. Field control tests shall be performed by independent testing laboratory personnel, at the expense of Contractor. Contractor shall provide access to all facilities and the services of one or more employees as necessary to assist with the field control testing.
   1. Air Content. An air content test shall be made on concrete from each batch of concrete from which concrete compression test cylinders are made. Air content shall be determined in accordance with ASTM C231.
   2. Slump. A slump test shall be made on concrete from each batch of concrete from which concrete compression test cylinders are made. Slump shall be determined in accordance with ASTM C143.
   3. Temperature. Temperature of the mix shall be measured and recorded prior to the start of pouring.
   4. Test Cylinders. Compression test specimens shall be made, cured, stored, and delivered to the laboratory in accordance with ASTM C31 and C39. Compressive strength tests will be evaluated in accordance with ACI 318 and as specified herein.
   5. One set of concrete test cylinders shall be cast for each concrete pour. A set of test cylinders shall consist of four six inch diameter cylinders. One cylinder shall be tested at 7 days, and two shall be tested at 28 days. The fourth shall be retained in the event an additional break is necessary. All concrete required for testing shall be furnished by, and at the expense of, Contractor.

End of Section

Section 05530

GRATING

PART 1 - GENERAL

1-1. SCOPE. This section covers the fabrication and installation of metal and fiberglass grating.

1-2. SUBMITTALS. Detailed fabrication and erection drawings covering the grating shall be submitted in accordance with the Submittals Procedures sections. Drawings shall indicate locations of grating supports, profiles, thicknesses, lengths, markings of panels, and fastening methods.

1-3. DELIVERY, STORAGE, AND HANDLING. Materials shall be handled, transported, and delivered in a manner which will prevent bends, dents, scratches, or damage of any kind. Damaged materials shall be promptly replaced. Materials shall be stored off the ground.

PART 2 - PRODUCTS

2-1. PERFORMANCE AND DESIGN REQUIREMENTS.

2-1.01. Design Criteria. Except as modified herein, the manufacture and fabrication of metal grating shall comply with recommendations in the "Metal Bar Grating Manual" of the National Association of Architectural Metal Manufacturers (NAAMM). Grating depth shall be as indicated on the Drawings.

Fiberglass grating shall be designed and fabricated to support 100 psf live load with a maximum deflection not greater than L/150 or 1/4 inch, unless indicated otherwise on the Drawings.

2-1.02. Carbon Steel Grating. Carbon steel grating shall be the welded type. Bearing bars shall be at least 3/16 inch thick with center-to-center spacing of 1-3/16 inch. Grating shall be galvanized.

2-1.03. Aluminum Grating. Aluminum grating shall be the pressure locked type, with cross bars deformed or swaged to prevent turning. Bearing bars shall be at least 3/16 inch thick flat stock or equivalent I-bars, with center-to-center spacing of 1-3/16 inches. Cross bar center-to-center spacing shall be 4 inches maximum. Grating shall be a mill finish.

2-1.05. Fiberglass Grating. Fiberglass grating shall be pultruded type with 6 inch cross bar spacing unless indicated on the Drawings to be molded type. All pultruded grating

shall have a surfacing veil and UV inhibitors in the resin. Molded grating shall have a square mesh pattern. Walking surfaces of pultruded grating shall have a grit finish. Walking surfaces of molded grating shall be concave or have a grit finish.

2-2. MATERIALS.

Carbon Steel Grating	NAAMM MBG 531, ASTM A1011, rectangular, welded, galvanized after fabrication.
Galvanizing	ASTM A123, A153, A385; G90 coating.
Aluminum Grating	NAAMM MBG 531, ASTM B221, 6063-T6 or 6061-T6 alloy, pressure or swage locked, mill finish
Fiberglass Grating	ASTM E-84, D635
Molded Type	Isophthalic polyester resin, ASTM E-84 flame spread of 25 or less; IKG Industries "Corgrate Molded SM", Fibergrate Composite Structures molded grating, Strongwell "Duragrate", Seasafe "Gator-Grate".
Pultruded Type	Vinyl ester resin, ASTM E-84 flame spread of 25 or less; IKG Borden "Corgrate FI" (flush top), Fibergrate Composite Structures "Safe-T-Span", Strongwell "Duradek/Duragrid", Seasafe "Gator-Deck".
Grating Stair Treads	Grating stair treads shall match the material and finish of grating in adjacent platforms and floors. Treads shall have a permanently attached or integral non-skid nosing.
Grating Fasteners	Manufacturer’s standard, AISI Type 316 stainless steel.
Clips, Bolts, Nuts, Washers	Manufacturer’s standard, AISI Type 316 stainless steel.
Welded Threaded Steel Studs	ASTM A108 fully threaded studs automatically welded with compatible nuts and washers; TRW Nelson Type CFL or acceptable equal.
Stepped Locking Fasteners	Non-penetrating, non-welded mechanical fasteners, with stainless steel clips and bolts, galvanized cast iron body; Lindapter “Grate-Fast” or Grating Specialty Co. “G-Clip”.

Fiberglass Grating Support Legs	Adjustable fiberglass legs specifically designed to support elevated molded fiberglass grating; Fibergrate Corporation "Grating Legs" or Strongwall Corporation "Elevated Floor System".
Fiberglass Curb Angle	Vinyl ester resin, fiberglass trim angle with integral concrete anchorage; Fibergrate Composite Structures "EZ angle" or Strongwell Corporation "Fiberglass Curb Angle".

2-3. FABRICATION. Grating shall be fabricated in panels that can be easily handled by plant personnel. Unless otherwise indicated on the Drawings, the weight of individual panels shall not exceed 150 lbs. Panels shall be within ±1/4 inch of authorized length and ±1/4 inch of authorized width, and shall have a maximum difference in length of opposite diagonals of 1/4 inch. The spacing of bearing bars shall be within 1/32 inch of authorized spacing. Cross bars and edge bars of adjacent panels shall align. After installation, there shall be not more than 1/4 inch clearance between panels. All bearing bars shall be parallel. Bands and toeplates shall align within 1/8 inch tolerance, vertical and horizontal.

Angular, circular, and re-entrant cuts in steel grating may be made by flame cutting. All other cuts in steel grating shall be sawed or sheared. Cuts shall be clean and smooth, without fins, beads, or other projections. Any damaged protective coating shall be fully restored.

All cuts in aluminum grating shall be sawed or sheared. All cuts in fiberglass grating shall be cut. All fiberglass grating which requires cutting shall have the affected surfaces sealed with catalyzed resin sealant of equal or superior corrosion resistance to the grating.

Grating panels shall be arranged so that openings are centered on a joint between panels. Toeplates extending the full depth of the grating and 4 inches above the top shall be provided around openings. Toeplates shall be welded to each bearing bar. The ends of bearing bars need not be banded unless required by the Drawings. Bands shall be welded to the first, the last, and every fourth intermediate bar. Bands and toeplates shall be 3/16 inch thick. Crossbars shall be cut off flush with the outside face of side bars.

Steel frames anchored to or cast in concrete to support grating shall be stainless steel or hot-dip galvanized after fabrication. The anchorage of fiberglass curb angles shall consist of intermittent embedded shapes or interlocking deformations on the back side of the angle.

2-4. SHOP COATING. Finish painting of grating, if required, is covered in the protective coatings section.

2-4.01. Galvanizing. All galvanizing shall be done by the hot-dip process after fabrication, in conformity with the requirements of ASTM A123, A153, and A385.

2-4.02. Aluminum. All surfaces of aluminum which will be in contact with concrete, mortar, or dissimilar metals shall be given a coat of epoxy enamel on the contact surfaces.

2-4.03. Fiberglass. All cut edges of fiberglass grating shall be sealed with catalyzed resin sealant of equal or superior corrosion resistance to the grating or as specified by the manufacturer. Sufficient quantities of edge repair coating shall be supplied with the grating.

PART 3 - EXECUTION

3-1. GENERAL. All grating shall lie flat, with no tendency to rock when installed. Poorly fitting or damaged grating shall be rejected. Grating openings may be field cut with the approval of Engineer, provided that no more than four adjacent bearing bars are cut. If the grating is cut or modified in the field, affected surfaces shall be repaired or sealed to assure restoration of the corrosion resistance of the grating. Field cut openings must be spaced so that there are at least as many continuous bars between each opening as there are cut bars at the opening.

3-2. ATTACHMENTS TO SUPPORTING STRUCTURE. All grating supported on steel, aluminum, or fiberglass structures shall be attached. Grating shall be attached to the supporting structure in accordance with the grating manufacturer's recommendations and submittals. Single span grating over flumes, manholes, pits, or other openings in concrete floors may rest unattached in recesses constructed for that purpose. To preclude excessive accumulation of tolerances, an extra-long panel shall be provided for each unanchored grating cover that exceeds 20 feet in length. The panel shall be cut to the required dimension after the remainder of the grating panels have been installed.

3-2.01. Prime Painted Steel Supports. Unless otherwise required or indicated on the Drawings, clip or flange block fasteners or stepped locking fasteners shall be used to attach grating to prime painted steel supports. Clip fasteners shall be secured to the supporting steel with through bolts in drilled holes. Through bolts shall be stainless steel. Fusion welded threaded studs may be utilized if the primer is removed before welding or if a suitable weldable primer is used. Welded studs shall be cleaned and prime painted to match the support steel prior to finish painting.

3-2.02. Galvanized Steel Supports. Unless otherwise indicated on the Drawings, stepped locking fasteners shall be used to attach grating to galvanized steel supports. The galvanized coating shall not be damaged.

3-2.03. Stainless Steel, Aluminum, and Fiberglass Supports. Unless indicated otherwise on the Drawings, clip or flange block fasteners or stepped locking fasteners shall be used

to attach grating to stainless steel, aluminum, or fiberglass supports. Fasteners shall be secured to the supporting structure with stainless steel through bolts in drilled holes. Welded fasteners shall not be used.

3-3. FINISH TOUCHUP. After erection, all grating shall be cleaned. Damaged coatings shall be touched up in accordance with the grating manufacturer's recommendations to fully restore the corrosion resistance of the grating. Cut ends of fiberglass grating pieces shall be sealed with catalyzed resin sealant of equal or superior corrosion resistance to the grating itself or repaired in accordance with the manufacturer's recommendations to assure full undamaged performance.

End of Section

Section 05550

ANCHORING IN CONCRETE

PART 1 - GENERAL

1-1. SCOPE. This section covers the procurement, fabrication, and installation of miscellaneous metals, including anchoring in concrete.

1-2. GENERAL. Unless otherwise specified or indicated on the Drawings all anchors and anchor bolts shall be cast-in-place anchor bolts with forged heads or embedded nuts and washers. Unless otherwise indicated, anchors and anchor bolts in concrete shall have a diameter of at least 3/4 inch.

Unless otherwise indicated on the Drawings, anchors and anchor bolts used in the following locations and applications shall be of the indicated materials. Anchors and anchor bolts in other locations and applications shall be as indicated on the Drawings.

Cast-In-Place Anchor Bolts.

Submerged locations	Stainless steel.
Locations subject to splashing	Stainless steel.
Buried locations	Stainless steel.
Anchorage of structural steel columns	Stainless steel.
Other exterior locations	Stainless steel.
Other interior locations	Stainless steel.

Adhesive, Expansion, and Undercut Anchors.

Submerged locations	Stainless steel.
Locations subject to splashing	Stainless steel.
Buried locations	Stainless steel.
Anchorage of structural steel columns	Stainless steel.

Other exterior locations	Stainless steel.
Other interior locations	Stainless steel.

Adhesive, expansion, and undercut anchors may be used instead of cast-in-place anchors where specifically indicated or permitted on the Drawings or with the specific acceptance by Engineer.

1-3. SUBMITTALS. Data, catalog cuts, and ICC ESR reports indicating the manufacturer and types of adhesive anchors, expansion anchors, and undercut anchors to be supplied shall be submitted in accordance with the Submittals Procedures section.

If Contractor requests use of products other than those indicated herein, calculations prepared by a registered professional engineer using methods and procedures required by the building code may be required as part of the submittal package.

1-4. DELIVERY, STORAGE, AND HANDLING. Materials shall be handled, transported, and delivered in a manner which will prevent damage or corrosion. Damaged materials shall be promptly replaced. Materials shall be shipped and stored in original manufacturer's packaging.

PART 2 - PRODUCTS

2-1. MATERIALS. Unless otherwise indicated in the Drawings, materials shall be as indicated below.

Anchor Bolts	
Stainless steel	Bolts, ASTM F593, Alloy Group 1 or 2; nuts, ASTM F594, Alloy Group 1 or 2 (minimum yield strength of 30 ksi for both bolts and nuts).
Flat Washers	ANSI B18.22.1; of the same material as anchor bolts and nuts.
Reinforcing Bars	ASTM A615, Grade 60, deformed.

Expansion Anchors in Concrete	Products shall be single component anchors tested in accordance with ICC AC193, and shall have an ICC ESR report in compliance with the International Building Code (2009 or later edition). The anchors shall be approved for use in cracked concrete, and for resisting seismic forces. Hilti "Kwik-Bolt TZ", ITW Red Head "Trubolt+", Powers Fasteners “Power-Stud+SD2”, Simpson “Strong-Bolt”.
Undercut Anchors in Concrete	Products shall be tested in accordance with ICC AC193, and shall have an ICC ESR report in compliance with the International Building Code (2009 or later edition). Hilti “HDA Undercut Anchor”, USP Structural Connectors “DUC Undercut Anchor”, Powers Fasteners “Atomic+ Undercut Anchor”.
Adhesive Anchors in Concrete	Products shall be tested in accordance with ICC AC308, and shall have an ICC ESR report in compliance with the International Building Code (2009 or later edition). The anchors shall be approved for use in cracked concrete, and for resisting seismic forces.
Threaded Rods and Nuts	As recommended by the adhesive manufacturer; materials as indicated on the Drawings or in this specification.
Adhesive	Hilti "HIT-RE 500 V3" or “HIT-RE 500-SD”, Powers Fasteners “PE1000+”, Simpson “Set-XP”.

2-2. ANCHORS.

2-2.01. Cast-in-Place Anchor Bolts. Cast-in-place anchor bolts shall be delivered in time to permit setting before the structural concrete is placed. Unless installed in pipe sleeves, anchor bolts shall be provided with sufficient threads to permit a nut to be installed on the concrete side of the concrete form or the supporting template. Two nuts, a jam nut, and a washer shall be furnished for cast-in-place anchor bolts indicated on the Drawings to have locknuts; two nuts and a washer shall be furnished for cast-in-place anchor bolts without locknuts.

2-2.02. Adhesive, Expansion, and Undercut Anchors. When adhesive, expansion, or undercut anchors are indicated on the Drawings, only acceptable systems shall be used. Acceptable systems shall include only those systems and products specified or specifically indicated by product name on the Drawings. Alternative anchoring systems may be used only when specifically accepted by Engineer.

Unless otherwise required, single nuts and washers shall be furnished for adhesive anchors, expansion anchors, and undercut anchors. Adhesive anchors shall be free of coatings that would weaken the bond with the adhesive.

PART 3 - EXECUTION

3-1. GENERAL. Anti-seize thread lubricant shall be liberally applied to projecting, threaded portions of stainless steel anchors immediately before tightening of the nuts.

3-1.01. ESR Report Compliance. Anchors shall be installed in accordance with all applicable requirements of the ESR report for the anchoring system. If conflicts are found between the Drawings and the ESR report installation requirements, Contractor shall notify Engineer for resolution.

3-1.02. Special Inspection. Special inspection shall be performed by Engineer or Owner's representative during installation of all anchors covered in this section. Anchorage work shall be performed in a manner that allows the inspections to take place without adversely impacting the schedule.

For cast-in-place anchor bolts, bolts shall be positioned in advance of the concrete placement so that the inspector will have sufficient time to inspect the bolts prior to placing concrete.

For other types of anchors, the minimum frequency and extent of the inspections shall be as indicated in the anchor system's ESR report.

3-2. CAST-IN-PLACE ANCHOR BOLTS. Cast-in-place anchor bolts shall be carefully positioned with templates and secured in the forms prior to placing concrete. Contractor shall verify that anchorage devices are positioned in accordance with the Drawings and with applicable equipment or structure submittal drawings.

Threads, bolts, and nuts spattered with concrete during placement shall be cleaned prior to final installation of the bolts and nuts.

3-3. ADHESIVE ANCHORS. The embedment depth and spacing for adhesive anchors or reinforcing bars shall be per the manufacturer's requirements unless otherwise indicated on the Drawings.

Adhesive shall be statically mixed in the field during application. All proportioning and mixing of the components shall be in accordance with the manufacturer's recommendations.

Anchors or bars shall be installed in holes drilled into hardened concrete. Diameter of holes shall be 1/16 inch larger than the outside diameter of the rod or bar unless recommended otherwise by the anchor system manufacturer. Holes shall be prepared by removing all dust and debris using procedures recommended by the adhesive manufacturer.

Adhesive anchors and holes shall be clean, dry, and free of grease and other foreign matter at the time of installation. The adhesive shall be placed and the rods or bars shall be set in accordance with the recommendations of the manufacturer. Care shall be taken to ensure that all spaces and cavities are filled with adhesive, without voids.

3-4. EXPANSION AND UNDERCUT ANCHORS. Expansion and undercut anchors shall be installed in accordance with the Drawings, but in no case shall the embedment depth be less than six bolt diameters. The minimum distance between the center of any anchor and an edge or exterior corner of concrete shall be at least six times the diameter of the bolt. Unless otherwise indicated on the Drawings, the distance between the centers of anchors shall be per the manufacturer’s requirements.

End of Section

Section 05990

STRUCTURAL AND MISCELLANEOUS METALS

PART 1 - GENERAL

1-1. SCOPE. This section covers the fabrication and erection of structural and miscellaneous metal items not covered in other sections.

Except as otherwise specified or indicated on the Drawings, all work shall conform to the applicable provisions of the AISC "Steel Construction Manual" and the Aluminum Association "Specification for Aluminum Structures".

1-2. SUBMITTALS. Complete data, fabrication drawings, and setting or erection drawings covering all structural and miscellaneous metal items shall be submitted in accordance with section 01330.

All bolted connections and welds shall be properly identified on the shop drawings. Welding procedures, welding procedure qualification records, and welder qualifications shall be submitted.

1-3. DELIVERY, STORAGE, AND HANDLING. Materials shall be handled, transported, and delivered in a manner which will prevent bends, dents, significant coating damage, or corrosion. Damaged materials shall be promptly replaced. Structural and miscellaneous metal work shall be stored on blocking so that no metal touches the ground and water cannot collect thereon. The material shall be protected against bending under its own weight or superimposed loads.

Bolting materials shall be stored indoors. Weld rod shall be stored in accordance with the supplier's instructions and AWS D1.1.

1-4. FABRICATOR QUALIFICATION. All fabricating plants providing structural steel shall be qualified fabricators who participate in the AISC Certification program and are designated an AISC Certified Plant, Category STD. Plant certification is not required for fabrication of miscellaneous metal which does not meet the AISC definition for structural steel found in the AISC "Steel Construction Manual" (13th edition), Part 16.

PART 2 - PRODUCTS

2-1. GENERAL. All structural steel shall be detailed and fabricated to facilitate compliance with OSHA 29 CFR Part 1926 subpart R and all other pertinent OSHA and local safety regulations.

All field connection materials shall be furnished.

2-2. MATERIALS.

Steel

Shapes (W, WT)	ASTM A992
Shapes (S, M, HP, C)	ASTM A36 or ASTM A572 Grade 50.
Plates and Bars	ASTM A36.
Sheets	ASTM A1008 CS Type B or A1011 CS Type B.
Pipe	ASTM A53, Type E or S, Grade B; ASTM A500, Grade B or C.
Square and Rectangular Structural Tubing	ASTM A500, Grade B or C.
Checkered Plate	ASTM A786, carbon steel, skid resistant pattern as standard; Inland "4-way Floor Plate" or U.S. Steel "Multigrip Floor Plate".
Bolts and Nuts	
Bolts, High Strength	ASTM A325, Type 1; tested in accordance with Article 9.2 thereof.
Bolts, unfinished	ASTM A307.
Nuts, Heavy-Hex	ASTM A563, grade and finish compatible with bolts.
Nuts, Self-Locking	Prevailing torque type; IFI-100, Grade A.
Washers	
Flat, Hardened	ASTM F436, Type 1.
Lock	ANSI/ASME B18.21.1, helical spring.
Beveled	ASTM F436.
Anchor Bolts	ASTM F1554, Grade 36

Threaded Rods	ASTM A36
Forged Steel Clevises and Turnbuckles	AISI C-1035
Forged Steel Eyebolts and Eyenuts	AISI C-1030, ANSI B 18.15 Type 2 shoulder pattern unless otherwise required
Forged Steel Sleeve Nuts	AISI C-1018, Grade 2
Stainless Steel	
Shapes	ASTM A276, Type 316L.
Plates	ASTM A240, Type 316L.
Pipe	ASTM A312, Grade TP316L
Tube	ASTM A269, Grade TP316L
Checkered Plate	ASTM A793, stainless steel, raised pattern A
Bolts	ASTM F593, Alloy Group 1 or 2
Nuts	ASTM F594, Alloy Group 1 or 2
Washers	
Flat	ANSI/ASME B18.22.1, Type 316.
Lock	ANSI/ASME B18.21.1, helical spring type, Type 316.
Aluminum	
Sheet and Plate	ASTM B209, Alloy 6061-T6.
Rolled Sections	ASTM B308, Alloy 6061-T6. All members shall be Aluminum Association standard shapes.
Rod and Bar (Rolled or Drawn)	ASTM B211, Alloy 6061-T6 or 2017-T4.
Extrusions	ASTM B221, Alloy 6063-T5 or T6.
Pipe	ASTM B429, Alloy 6061-T6.

Rivets	ASTM B316, Alloy 6061-T6.
Bolts, Aluminum	ASTM F468, Alloy 2024-T4.
Nuts, Aluminum	ASTM F467, Alloy 6061-T6.
Washers, Aluminum	
Flat	ANSI/ASME B18.22.1, Type 6061 T-6.
Lock	ANSI/ASME B18.21.1, helical spring type, Type 6061-T6.
Castings	ASTM B26 or B85.
Checkered Plate	ASTM B632, Type 6061-T6.
Weld Metal (Steel Connections)	ANSI/AWS D1.1, Table 3.1, filler metal with minimum 70 ksi tensile strength unless otherwise required.
Welded Headed Studs, Concrete Anchors, and Shear Connectors	ASTM A108 with a minimum 50,000 psi yield strength and minimum 60,000 psi tensile strength. TRW/Nelson or equal.
Deformed Bar Anchors (DBA)	ASTM A496 with a minimum 70,000 psi yield strength and minimum 80,000 psi tensile strength. TRW/Nelson division or equal.
Rails	
Crane	ASTM A1.
Railroad	ASTM A1.
Shop Coatings	
Universal Primer	As indicated in section 09900.
Epoxy Enamel	As indicated in section 09900.
Galvanizing	ASTM A123, A153, A385.

2-3. FABRICATIONS. The following fabrications shall be constructed as indicated on the Drawings and as specified herein.

2-3.01. Platform/Stairs. Platforms and stairs shall be fabricated to the dimensions, arrangements and sizes indicated on the Drawings. Platforms and stairs shall be true to

line and slope, shall be rigidly supported, and shall be braced and tightened to prevent movement. All treads shall be level and in perfect alignment and spacing. Handrails shall be in alignment and rigidly connected.

After installation, platforms and stairs shall be rigid and shall not sway noticeably or deflect under foot traffic. If necessary to prevent noticeable movement, additional supports or bracing shall be provided.

2-3.01.01. Platform/Stair Design. Platforms and stairs shall be designed by the supplier in general accordance with details indicated on the Drawings. The design shall comply with all applicable provisions of the local building code, ANSI A117.1, and OSHA as applicable. The design shall be sealed by an engineer registered in the state of the project. If requested, calculations shall be submitted for review.

The completed fabrications shall support a uniform live load of 100 lbs per square foot and a concentrated load of 300 lbs for stair fabrications and 750 lbs for platform fabrications applied at the center of the span. Individual treads shall be designed to support a uniform live load of 100 lbs per square foot or a 300 lb concentrated live load applied on an area of 4 square inches. Vertical deflections under full live load shall be limited to span/240. Stairs and platforms shall be braced or otherwise designed to avoid noticeable side-sway.

The platform and stair design and details shall be coordinated with the handrailing and guardrailing supplied. Platform and stair members shall be adequate to accept loads from the rail posts based upon the criteria in the Handrailing, Guardrailing, and Ladders section.

Connections between the platform and stair members and the supporting structure shall be adequate to transfer all loadings with a factor of safety of at least 3.0 times service load. The number and type of connections shall comply, at a minimum, with the Drawings. All necessary brackets, bolts, and anchors shall be provided.

2-3.01.02. Nosings. All stair treads shall have non-skid nosings, either fabricated integrally with the tread or attached with stainless steel bolts and self-locking nuts.

2-3.01.03. Grating Stairs. Treads shall be fabricated from grating material in accordance with the grating section.

2-3.01.04. Cast Aluminum Stairs. Risers and subtreads shall be fabricated from cast aluminum as indicated on the details on the Drawings.

2-3.02. Checkered Floor Plates. Checkered floor plates shall be aluminum unless specifically designated on the Drawings as galvanized steel or stainless steel. Shop welded stiffeners or grating backup shall be provided as indicated on the Drawings. Stiffeners and grating backup shall be of the same material as the checkered plate.

Checkered floor plates which are indicated to be removable shall be detailed and fabricated in sections which weigh no more than 150 lb, and shall be provided with lifting holes to facilitate removal. Warped or bent plates shall be straightened so they will lie perfectly flat.

Checkered floor plates shall be secured to structural shapes or grating using 3/8 inch stainless steel slotted flathead machine screws at 12 inch centers, Lindapter "Floor-Fast" stepped locking fasteners, or as indicated on the Drawings. Connection devices shall not protrude above the plate surface. Access holes shall be provided in the plate if required to allow access to grating hold-down devices beneath the plate.

2-4. SHOP COATING. All structural and miscellaneous metal items shall be shop coated as specified herein. The requirements for field painting are covered in section 09900.

2-4.01. Cleaning. Surfaces shall be dry and of proper temperature when coated, and shall be free of grease, oil, dirt, dust, grit, rust, loose mill scale, weld flux, slag, weld spatter, and other objectionable substances. Articles to be galvanized shall be pickled before galvanizing. All other ferrous metal surfaces shall be cleaned by solvent, high-speed power wire brushing or by blasting to the extent recommended by the paint manufacturer and as required in the protective coatings section.

2-4.02. Edge Grinding. Sharp projections of cut or sheared edges of ferrous metals which will be submerged in operation, except for items specified to be hot-dip galvanized, shall be ground to a radius as needed to ensure satisfactory paint adherence and as required in the protective coatings section.

2-4.03. Prime Painted Steel. Unless otherwise specified or indicated on the Drawings, all ungalvanized structural and miscellaneous steel shall be given a universal prime coat in the shop after fabrication. The dry film thickness of the universal primer shall be at least 5 mils. Steel surfaces shall be prime-coated as soon as practicable after cleaning. Steel shall not be moved or handled until the shop coat is dry and hard.

2-4.04. Galvanizing. Steel materials required to be galvanized are indicated on the Drawings. All galvanizing shall be done by the hot-dip process after fabrication. An approved zinc-rich paint shall be used to touch up minor coating damage. Materials with significant coating damage shall be re-galvanized or replaced.

Where galvanized bolts are indicated on the Drawings or specified, the use of zinc-plated bolts will not be acceptable.

2-4.05. Stainless Steel. Unless otherwise specified, all items fabricated from stainless steel shall be thoroughly cleaned and degreased after fabrication. Pickling or a light blast cleaning shall produce a modest etch and remove all embedded iron and heat tint. Surfaces shall be subjected to a 24 hour water test or a ferroxyl test to detect the presence of residual embedded iron and shall be retreated as needed to remove all traces of iron

contamination. Surfaces shall be adequately protected during shipping and handling to prevent contact with iron or steel objects or surfaces.

2-4.06. Aluminum. All surfaces of aluminum which will be in contact with concrete, mortar, or dissimilar metals shall be given a coat of epoxy enamel.

PART 3 - EXECUTION

3-1. STRUCTURAL STEEL ERECTION. Structural steel shall be erected so that individual pieces are plumb, level, and aligned within a tolerance of 1:500. The elevations of the top of floor and roof members shall be within 1/16 inch of the elevations indicated on the Drawings. The faces of girts and other supporting members for rigid wall panels shall be in vertical planes within a maximum variation of 1/8 inch.

All members and parts, as erected, shall be free of warps, local deformations, and unauthorized bends. All parts shall be assembled accurately as indicated on the Drawings. Light drifting will be permitted to draw parts together, but drifting to match unfair holes will not be permitted. Any enlargement of holes necessary to make connections in the field shall be done by reaming with twist drills and only with the approval of Engineer. Enlarging holes by burning will not be permitted.

Baseplates shall be set level in exact position and grouted in place.

All materials shall be erected in compliance with OSHA 29 CFR, Part 1926, Subpart R, and with all other applicable OSHA and local safety regulations.

3-2. STRUCTURAL STEEL CONNECTIONS. Unless otherwise indicated on the Drawings, bolted connections for structural steel, as defined in the AISC manual, shall be made with ASTM A325 high strength bolts conforming to the "Specification for Structural Joints Using ASTM A325 or A490 Bolts" as approved by the Research Council on Structural Connections. The method of installation, pretensioning procedures, bolting equipment and tools shall likewise conform to the above referenced standard.

Bolts in all structural steel connections, both bearing and slip critical, shall be fully pretensioned in accordance with the AISC standards unless specifically noted otherwise on the Drawings. The turn-of-the-nut method or load-indicator washers shall be used to verify pretensioning of bolts in bearing type connections. When using turn-of-the-nut method the bolt, nut, and material shall be match marked. A wax lumber marker or paint shall be used to clearly mark the assembly. The calibrated wrench method of pretensioning bolts will not be permitted.

Load indicator washers shall be used to verify pretensioning of bolts in slip critical connections. Load indicator washers shall be installed in accordance with the manufacturer's recommendations, as supplemented herein. To facilitate proper tightening of fastener assemblies with load indicator washers, a hardened flat washer shall be

installed under the turned element (bolt head or nut) and between the turned element and the load indicator washer protrusions, in all cases. Whenever possible, the load indicator washer shall be installed on the head end of the bolt. If the bolt head will not be visible for inspection of the indicator washer after installation, or if the bolt head must be turned to tighten the assembly, the load indicator washer may be installed on the nut end of the bolt.

Tightening of each connection assembly shall progress systematically from the most rigid part of the joint toward the free edges until all have been sufficiently rotated or the load indicator washers on all bolts have been closed to the average gap stipulated by the load indicator washer manufacturer.

Bolt holes shall have a diameter nominally 1/16 inch larger than the nominal bolt diameter.

Contact surfaces of slip critical connections shall not be shop coated. Contact surfaces of bearing type connections may be shop coated. When assembled, all joint surfaces, including those adjacent to the bolt heads, nuts, or washers, shall be free of loose mill scale, dirt, burrs, oil, and other foreign material that would prevent solid seating of the parts.

Beveled washers shall be used when the bearing faces of bolted parts have a slope of 1:20 or greater with respect to a plane perpendicular to the bolt axis. Bolt length shall be increased as needed to accommodate the beveled washers.

Bolts, nuts, and washers shall be galvanized when connected materials are galvanized or where indicated on the Drawings.

3-3. MISCELLANEOUS STEEL CONNECTIONS. Connections for miscellaneous steel fabrications not included in the AISC definition of structural steel shall be made with bolts matching the connected materials.

3-4. STRUCTURAL AND MISCELLANEOUS STEEL WELDING. Welding and related operations shall conform to applicable provisions of the Structural Welding Code - Steel, AWS D1.1, of the American Welding Society. All welding shall be performed in accordance with written procedures, using only those joint details which have prequalified status when performed in accordance with AWS D1.1. All welding shall be performed by welders qualified in accordance with the American Welding Society for steel welding and American Society for Mechanical Engineers Section IX for stainless steel welding.

All welds shall be visually inspected in accordance with AWS procedures.

Welds not dimensioned on the Drawings shall be sized to develop the full strength of the least strength component of the connection.

Where structural or miscellaneous steel connections are welded, all butt and miter welds shall be continuous and, where exposed to view, shall be ground smooth. Intermittent

welds shall have an effective length of at least 2 inches and shall be spaced not more than 6 inches apart.

Surfaces to be welded and surfaces within 2 inches of a weld shall be free from loose or thick scale, slag, rust, moisture, grease, paint and other foreign materials that would prevent proper welding or release objectionable fumes.

Only shielded metal arc, gas metal arc, flux cored arc, submerged arc, and gas tungsten arc welding are permitted. For flux cored arc welding, only E70xx one (1) or five (5) wire electrodes with supplemental gas shielding shall be permitted. Use of electroslag or electrogas welding processes or the short-circuiting transfer mode of the gas metal arc process will not be acceptable.

Field welded connections shall not be substituted for field bolted connections indicated on the Drawings.

Deformed bar anchors, headed studs, concrete anchors and shear connectors shall be welded with an automatic stud welding gun per the manufacturer's recommendation. Hand welding will not be acceptable.

3-5. STRUCTURAL AND MISCELLANEOUS ALUMINUM. Unless otherwise noted, all work shall conform to applicable provisions of the Aluminum Association "Specification for Aluminum Structures".

3-5.01. Connections. Connections not specifically detailed on the Drawings shall develop the full strength of the least strength member of the connections. Bolted connections shall be all-bolted bearing type, equipped with a helical spring lock washer under the stationary element (bolt head or nut) and a flat washer under the turned element. All bolts shall be fully tightened. Bolts and nuts for structural aluminum connections shall be Type 316 stainless steel. Bolts and nuts for non-structural miscellaneous aluminum assemblies shall be Type 316 stainless steel or aluminum. A sufficient number of bolts shall be provided in each connection to develop the shear strength of the member.

Welded connections shall be made in accordance with the American Welding Society D1.2, Structural Welding Code - Aluminum. All welding shall be performed by welders qualified in accordance with American Welding Society. Welds shall be free of porosity, cracks, holes, and flux. Welded connections shall not be substituted for bolted connections without prior approval of Engineer.

3-5.02. Erection. Structural aluminum shall be erected so that individual pieces are plumb, level, and aligned within a tolerance of 1:500. The elevation of horizontal members shall be within 1/16 inch of the elevation indicated on the Drawings.

Baseplates shall be set level in exact position and grouted in place.

End of Section

SECTION 07900

CAULKING AND SEALANTS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Caulking and sealants on the project, including primers and backer rod material.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 REFERENCES

A. ASTM C920–Elastomeric Joint Sealants.

1.03 SUBMITTALS

A. Submittals shall comply with provisions of Section 01300–Submittal Procedures.

B. Submit color chart for each sealant used on project. Colors will be selected by ENGINEER.

C. Submit copies of warranty.

1.04 WARRANTY

A. Caulked joints shall be weather-tight and guaranteed watertight by installer for 2 years from the earlier of either the date established for Substantial Completion of the project. Deliver original guarantee to OWNER.

B. Provide manufacturer's standard 5-year product warranty.

PART 2–PRODUCTS

2.01 CAULK FOR NON-SUBMERGED APPLICATIONS –GENERAL

A. Caulk for non-submerged applications in all locations except floor joints shall be a one-part polyurethane sealant.

B. Acceptable products include the following:
1. Masterseal NP1 by BASF Construction Chemicals, LLC.
2. Vulkem 116 by Tremco, Inc. (exterior applications only).
3. Dymonic 100 by Tremco, Inc.

2.02 CAULK NON-SUBMERGED APPLICATIONS –FLOOR JOINTS

A. Caulk for floor joints in non-submerged applications shall be a one-part, self-leveling, polyurethane sealant.

B. Acceptable products include the following:
   1. SL1 by BASF Construction Chemicals, LLC.
   2. Vulkem 45 SSL by Tremco, Inc.

2.03 ACCESSORIES

A. Backer rod shall be flexible, closed-cell polyethylene rod stock sized to be under at least 25% compression when positioned in the joint. In shallow joints and where backer rod is not used, polyethylene bond breaker tape shall be used. It is essential that the caulk bond to the side of the joint but not to the base of the joint.

B. Primer shall be used where required by the manufacturer for the specific product used and the specific application intended. Specific product shall be as recommended by the manufacturer.

C. Cleaning fluid shall be methyl ethyl ketone (MEK) or methyl isopropyl ketone (MIK) solvent material which will not etch or mar metal finishes and shall be the product of a nationally recognized manufacturer, of type expressly recommended for use with the caulking or sealant compound used.

PART 3–EXECUTION

3.01 INSTALLATION

A. Seal completely all joints around entire perimeter of all openings in all walls (inside and outside faces), including joints at all doors, windows, louvers, sills, and elsewhere as noted on the drawings and as necessary to seal all open joints in the building in a complete manner. Joints in exterior walls shall be caulked in a completely weather-tight manner. Joints between interior walls and concrete ceilings and other interior joints shall be caulked as indicated on the drawings. Caulking not specified in other sections shall be performed under this heading.

B. All caulking shall be done in accordance with manufacturer’s specifications. Allow minimum 28-day curing period for concrete, grout, or mortar prior to caulking unless requested otherwise. Caulking work shall be done before the final coat of paint is applied except at moving joints which shall be finish painted before caulking or caulking shall be protected during painting. All caulking shall occur only when the temperature is above 40°F.

C. Joints shall be thoroughly cleaned and primed before caulking in accordance with manufacturer's instructions. Unless otherwise shown, joints shall be square in cross section 1/2-inch by 1/2-inch and shall comply with manufacturer's joint width/depth ratio limitations.

D. Backer rod shall be used in all openings 3/4 inches or more in depth and shall be tightly packed to completely fill the space to 1/2-inch back of face. The 1/2-inch shall then be filled with caulking compound.

E. Caulking shall be done by hand gun. Compound shall be driven into joint grooves with sufficient pressure to force out all air and fill joint grooves solidly. Caulking where exposed shall be free of wrinkles and shall be uniformly smooth.

F. At completion of caulking, clean off all excess material from adjoining surfaces and material. Entire installation shall be left in a perfect appearing weather-tight condition.

3.02 CAULKING EXISTING JOINTS

A. All caulked joints in walls, ceilings, and floors requiring painting in the documents shall be re-caulked. Existing caulk and backer shall be completely removed. Caulk joints as specified for new construction.

B. Caulking of existing joints shall be coordinated with Section 09900–Painting.

END OF SECTION

SECTION 08110
HOLLOW METAL DOORS AND FRAMES

1 GENERAL

1.01 SUMMARY

A. This Section Includes:

1. Hollow Metal Doors: Supply non-fire rated doors as indicated on the drawings. The Contractor shall furnish all labor, services, tools, equipment, utilities, supervision, and appurtenances necessary to complete the installation of the doors, frames, and accessories.

2. Hollow Metal Door Frames: Supply hollow metal frames fabricated by the door manufacturer and fully grout after installation. The Contractor shall furnish all labor, services, tools, equipment, utilities, supervision, and appurtenances necessary to complete the installation of the doors, frames, and accessories.

3. Installer must be an experienced door installer who is certified in door installation, including a record of successful in-service performance with work of similar nature to this project.

4. Contractor shall supply and install all doors, frames, hardware, and accessories as outlined and described below. All new frames shall have existing opening anchors and be caulked in tight. All doors and frames shall be painted by contractor. Potential bidders are responsible for verifying that all necessary components and hardware for the installation are included.

B. Related Work Specified In Other Sections:

1. Door Hardware ..... Section 08710.

2. Painting..... Section 09900.

1.02 QUALITY ASSURANCE

A. Codes and Standards: Comply with the standards of door industry as listed in this Section.

B. Workers' Qualifications: Provide copies of worker certifications.

1.03 SUBMITTALS

A. Qualification data shall be provided for installers where certifications required.

B. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to District. Remove and replace damaged items that cannot be repaired as directed.

C. Store doors and frames at site under cover. Place units on minimum 4-inch high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum ¼-inch (6-mm) spaces between stacked doors to permit air circulation.

1.05 GUARANTEE

A. The Contractor shall provide to the Owner a written guarantee for all materials and workmanship**,** including sealants**,** for a period of 2 years from the date of final acceptance.

2 PRODUCTS

2.01 Steel Doors

A. Acceptable manufacturers, subject to compliance with these specifications and requirements, offering products that may be incorporated into the work include but are not necessarily limited to the following

1. Amweld Building Products, Inc.
2. Curries Company
3. Steelcraft; a division of Ingersoll-Rand

B. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B, free of scale, pitting, or surface defects; pickled and oiled.

C. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness.

D. Metallic-Coated Steel Sheets: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with an A40 (ZF120) zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.

E. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating; mill phosphatized; suitable for unexposed applications; stretcher-leveled standard of flatness where used for face sheets.

F. General: Provide doors of sizes and thicknesses required for existing openings including panels above the doors, and designs indicated on the door schedule. Field-verify all dimensions prior to fabrication.

1. Flush: Smooth door faces
2. Single: Single door and frame.
3. Pair: Set of 2 Doors and frame, with an astragal and coordinators.
4. Narrow Light: Glazing no more than 6” wide and only in upper half of door.

G. All Doors: Provide doors complying with requirements indicated herein by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level.

1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush) 16 gage.

H. Vision Light Systems: Manufacturer’s standard kits consisting of glass light moldings to accommodate glass thickness and size of vision light where indicated.

I. Panels: The metal panels above doors to be similar in design, insulation, materials, and finish as the doors.

J. Insulation: Provide door, panel, and frame insulation per item 3.01 Fabrication.

K. Glazing:

1. Glass Thickness per ASTM C1036 and E1300 following requirements.
   a. Wind load of at least 60 psf
   b. Thickness designed so maximum lateral deflection at design wind pressure no more than lesser of 1” or 1/50 times short side length.
   c. Minimum thickness not less than ¼”.
2. Dual sealing system with primary and secondary sealants.
3. Gaskets: Use black compression gaskets of material suitable for the environment, with profile and hardness required to maintain a water tight seal. Glazing sealants or tape shall only to be used where approved by Owner.
4. Design ambient temperature change of 120 degrees Fahrenheit.

2.02 Frames

A. General: Provide steel frames for doors, transoms, and other openings that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.

B. Frames of 0.0625-inch-(16 gage) thick steel sheet for:

1. Level 3 steel doors, unless otherwise indicate.

C. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.

D. Inserts, Bolts, and Fasteners: Manufacturer’s standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153/A 153M, Class C or D as applicable.

2.03 PAINT

A. Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptable criteria.

B. Finish Paint: Rust preventative, gloss enamel, per Section 09900 in architectural brown color approved by Owner.

3 EXECUTION

3.01 Fabrication

A. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.

B. Exterior Door Construction: For exterior locations and elsewhere as indicated, fabricate doors, panels, and frames from metallic-coated galvanized steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch-(1.3-mm-) thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.

1. Cold-rolled steel sheet, unless otherwise indicated.

C. Core Construction: Manufacturer's standard core construction that produces a door complying with SDI standards.

D. Clearances for Non-Fire-Rated Doors: Not more than 1/8 inch (3.2 mm) at jambs and heads, except not more than ¼ inch (6.4 mm) between pairs of doors. Not more than ¾ inch (19 mm) at bottom.

E. Single Acting, Door-Edge Profile: Square edge.

F. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

G. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and molding from either cold- or hot-rolled steel sheets.

H. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

I. Thermal-Rated (Insulating Assemblies): At exterior locations, provide doors and panels fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies.

1. Unless otherwise indicated, provide thermal-rated assemblies with U-value of 0.41 Btu/sq. ft. x h x deg F or better.

J. Hardware Preparation: Prepare doors and frames to receive hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.

K. Frame Construction: Fabricate frames to shape shown.

Fabricate frames with mitered or coped and continuously welded corners and seamless face joints, unless otherwise indicated.
Fabricate knockdown, drywall slip-on frames for in-place gypsum board partitions.
For exterior applications, fabricate frames with mitered or coped and continuously welded corners and seamless face joints.
Provide welded frames with temporary spreader bars.

L. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.

M. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

3.02Installation

A. General: Install steel doors, frames, and accessories according to manufacturer's data, door schedule, and as specified.

B. Placing Frames: Comply with provisions in SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. Except for frames located in existing walls or partitions, place frames before construction of enclosed walls and ceilings.
2. In masonry construction, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.
3. In existing concrete or masonry construction, provide at least three completed opening anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.
4. In metal-stud partitions, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Attach wall anchors to studs with screws.

C. Door Installation: Comply with ANSI A250.8. Fit hollow-metal doors accurately in frames, within clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G.

D. Adjusting: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

3.03 Painting and Cleaning

A. Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.

B. Protection Removal: Immediately before final cleaning and painting, remove protective wrappings from doors and frames.

C. Finish Coat Application: Two coats of finish paint shall be applied to all doors and frames.

D. Clean adjacent surfaces soiled by door installation. Clean all hardware and ensure all door hardware is without damage or deterioration at time of substantial completion.

END OF SECTION

SECTION 08710
DOOR HARDWARE

1 GENERAL

1.01 SUMMARY

A. Work Included In This Section Features:

1. Installer(s) must be an experienced door installer who is certified in door hardware installation, including a record of successful in-service performance with work of similar nature to this project.

2. Contractor shall supply and install all doors, frames, hardware, and accessories. Potential bidders are responsible for verifying all necessary components and hardware for installation is included.

B. Related Work Specified In Other Sections:

1. Hollow Metal Doors And Frames..... Section 08110.

2. Painting ..... Section 09900

1.02 QUALITY ASSURANCE

A. Codes and Standards: Comply with the standards of door industry as listed in this Section.

B. Workers' Qualifications: Provide copies of worker certifications.

1.03 SUBMITTALS

A. Qualification data shall be provided for installers where certifications required.

B. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver door hardware in suitable packaging to provide protection during transit and job storage. Provide additional protection to prevent damage to finishes.

B. Inspect materials on delivery for damage and completeness; notify shipper and supplier if damage is found. Remove and replace damaged items.

C. Store hardware inside in a dry environment.

1.05 GUARANTEE

A. The Contractor shall provide to the Owner a written guarantee for all materials and workmanship**,** including sealants**,** for a period of 2 years from the date of final acceptance.

2 PRODUCTS

2.01 FASTENERS

A. Types: Machine screws and flush shells.

B. Screws: Full threaded Phillips head type, not combination type.

C. Material: Stainless steel.

D. Size: Suitable for heavy use exterior doors.

2.02 HINGES

A. Hinges
1. Template: Provide only template-produced units per BHMA A156.7.
2. Hinge Base Material: Provide stainless steel, with stainless steel pin.
3. Hinge Options: Comply with the following:
   a. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed.
   b. At least 5 knuckles required per hinge.
   c. Concealed ball bearings with interior self lubricating bushings.
   d. Three hinges required on all doors up to 86” tall.
4. Fasteners: Comply with the following:
   a. Screws: Phillips flat-head screws; machine screws (drilled and tapped holes) for metal doors. Finish screw heads to match surface of hinges.

2.03 HANDSETS

A. Doors shall be compatible with the locksets specified herein.

B. All locksets shall be Grade 1.

C. Cylindrical Lever Locksets:

1. Marks Survivor Series, 195N/26D

2. Corbin Russwin, equivalent to above

2.04 CLOSERS

A. Closers: Heavy duty parallel arm closers to resist damage from high speed wind, with positive stop and hold open feature. Closers shall have adjustable closing power for use on various size doors and to allow adjustment of closing speed; opening force shall initially be set at 8 pound operating effort.

1. Sargent 351 Series aluminum closer.

2.05 MISCELLANEOUS DOOR HARDWARE

A. Exit Device/Panic Bars:

1. Corbin Russwin ED5200-630-WO36 or equal model to fit door size.

2. Equivalent product matching quality and features of above.

B. Door Gasketing

1. General: Provide continuous weather-strip gasketing on exterior doors and provide sound gasketing on CoGeneration Office door. Provide noncorrosive fasteners for exterior applications.
   a. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
   b. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
   c. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
2. Fire-Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL 10B or NFPA 252.
3. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
4. Gasketing Materials: Comply with ASTM D 2000 and AAMA 701/702.

C. Thresholds

1. Provide aluminum or stainless steel thresholds to suit the installed environment.
2. Auxilliary Hardware: DHMA Grade 1, unless otherwise indicated.
3. Set thresholds in full bed of sealant.

2.06 FINISHES

A. As indicated for each individual item.

B. Painted items to comply with Section 09900 Painting.

3 EXECUTION

3.01 EXAMINATION

A. Inspect doors and door frames for damage or defects and examine hardware for compatibility with receiving conditions and suitability for intended use.

B. Verify that required reinforcements were installed.

C. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

D. Hardware Preparation: Prepare doors and frames to receive hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.

E. Locate hardware as indicated and if not indicated according to ANSI A250.8.

3.02 INSTALLATION

A. Install finish hardware in accordance with manufacturer's templates and instructions.

B. Accurately and properly fit hardware.

C. Securely fasten fixed parts for smooth, trouble-free, non-binding operation.

D. Ensure that operating parts move freely and smoothly without binding, sticking, or excessive clearances.

E. Protect door hardware from damage or marring of finishes during construction. Door hardware shall be free of finish paint after final clean-up.

F. Closers:

1. Adjust to operate noiselessly and evenly.
2. Manufacturer or installer shall adjust to match specified door pull.

G. Gasketing: Mount gaskets to provide complete contact between door and frame, finished floor, or both. Provide weather-tight enclosure.

H. Thresholds:

1. Install immediately before final inspection to protect from construction activity.
2. Cope to fit door frame profile and drill to accommodate flush bolts.
3. Set in double bead of sealant, tightly fit at jambs and make waterproof.
4. Fasten to concrete slab with 5/16-inch stainless steel flat head countersunk machine screws and concrete anchors at 8-inch centers.

3.03 ADJUSTING AND CLEANING

A. Examine hardware for proper installation and operation. Lubricate bearing surfaces.
B. Clean adjacent surfaces soiled by installation.
C. Remove protective materials and clean all hardware; ensure all door hardware is without damage or deterioration at time of substantial completion.

END OF SECTION

SECTION 09900

PAINTING

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Surface preparation and application of paints and coatings. In addition to new work requiring coating, the existing concrete masonry and reinforced concrete walls and ceilings shall be prepared and painted in the Lower Screen Room, Upper Screen Room, Loading Area, and Utility Room.

B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 REFERENCES

A. ASTM B117–Test Method of Salt Spray (Fog) Testing.

B. ASTM D2247–Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.

C. ASTM D3363–Test Method for Film Hardness by Pencil Test.

D. ASTM D4060–Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.

E. ASTM D4541–Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

F. ASTM D4585–Practice for Testing Water Resistance of Coatings Using Controlled Condensation.

G. SSPC–The Society for Protective Coatings–Steel Structures Painting Manual.

H. NACE–National Association of Corrosion Engineers.

I. Federal Register–Code of Federal Regulations (CFR).

J. Federal Register–Resource Conservation and Recovery Act (RCRA).

K. Federal Register–Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

1.03 SUBMITTALS

A. Submittals shall be in accordance with provisions of Section 01330 Submittal Procedures.

B. Shop primer proposed for use shall be submitted with all material and equipment submittals. All shop primers shall be of the same generic type and quality as those specified herein.

C. Submit two copies of manufacturer's Material Safety Data Sheets (MSDS) for each type of paint with each shop drawing submittal. MSDS sheets shall be posted at the construction site at all times painting is in progress.

D. Substitution submittals shall include performance test data, as certified by a qualified testing laboratory, for the ASTM tests specified in paragraph 2.01.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: All paints, surface preparation, and application methods shall conform to federal requirements for allowable exposure to lead and other hazardous substances.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the site in original containers with labels intact and seals unbroken.

B. Drop cloths shall be used in all areas where painting is done to fully protect other surfaces.

C. Oily rags and waste must be removed from the building each night or kept in an appropriate metal container.

1.06 ENVIRONMENTAL REQUIREMENTS

A. CONTRACTOR shall dry-heat, dehumidify, and ventilate to obtain painting conditions recommended by the paint manufacturer during surface preparation, application, and cure.

B. Relative humidity conditions as specified by the paint manufacturer's data sheet shall be adhered to. This includes times in which supplemental heat is used. Supplemental heating units shall be located outside the structure with temporary ducting into the rated rooms. Temporary ducts shall be removed whenever the heating equipment is not in use. Indirect-fired hot ar furnaces or indirect electric heaters, open-flame heaters shall not be used.

C. No unprotected, unheated exterior painting shall be undertaken when damp weather appears probable, nor when the temperature of the substrate is below 55°F, unless approval in writing is received from the paint manufacturer.

1.07 COLOR SELECTIONS

A. Owner shall approve all colors.

PART 2–PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. All materials required for painting shall be types and quality as manufactured by Tnemec Company, Inc. or Sherwin Williams Company.

B. Where thinning is necessary, only the products of the manufacturer furnishing the paint will be allowed. All such thinning shall be done strictly in accordance with the manufacturer's instructions.

C. Paint and paint products of Tnemec Company and Sherwin Williams, listed in the following specifications, are set up as standard of quality.

PART 3–EXECUTION

3.01 SURFACE PREPARATION

A. General:
1. All surfaces to be painted shall be prepared as specified herein and by the manufacturer's published data sheet and label directions. The objective shall be to obtain a uniform, clean, and dry surface.
2. No field painting shall be done before the prepared surfaces are observed by ENGINEER. Surfaces painted without such observation shall be abrasive-blast-cleaned and repainted.
3. Prior to field-blasting, a sample of the blast abrasive shall be provided to ENGINEER for pH testing. Additional samples of subsequent deliveries or batches of blast abrasive shall be provided to ENGINEER for pH testing.
4. For on-site abrasive-blasting, low-dust, low-silica content material shall be used. Staurolite abrasive shall be used on concrete and concrete block.
5. Quality of surface preparations indicated below are considered minimum requirements. If paint manufacturer requires a better preparation for a particular application, it shall be considered a requirement of this specification.
6. All concrete surfaces shall be tested for moisture in accordance with ASTM D4263 and F1869. Surfaces shall also be verified that the pH of the cleaned concrete surface to be coated is within the range of 8 to 11.

B. Ferrous Metal:
1. All ferrous metal to be primed in the shop shall have all rust, dust, and mill scale, as well as all other foreign substances, removed by abrasive blasting. Cleaned metal shall be primed or pretreated immediately after cleaning to prevent new rusting.
2. All ferrous metals not primed in the shop shall be abrasive-blasted in the field prior to application of the primer, pretreatment, or paint. Contractor shall provide a heated structure in which these blasting and painting operations can be completed.
3. Abrasive blasting of metals in the shop shall be in accordance with SSPC-SP 10 Near White Blast Cleaning. Abrasive blasting of metals in the field for immersion service shall be in accordance with SSPC-SP 10 Near White Blast Cleaning. Abrasive blasting

of metals in the field for non-immersion service shall be in accordance with SSPC-SP6 Commercial Blast Cleaning.

4. Solvent cleaning in accordance with SSPC-SP1 shall precede all abrasive-blasting operations.
5. Existing iron pipe shall be prepared by abrasive blasting per National Association of Pipe Fabricators NAPF 500-03-04 Abrasive Blast Cleaning.
6. Existing motors, pumps, and piping which are to remain shall be power tool cleaned to remove all existing coatings as specified in SSPC-SP15 Commercial Grade Power Tool Cleaning or NAPF 500-03-03 Power Tool Cleaning.
7. Existing ferrous metal materials which are impractical to abrasive-blast onsite and impractical to remove from the site shall be power-tool cleaned to bare metal as specified in SSPC-SP15 Commercial Grade Power Tool Cleaning or NAPF 500-03-03 Power Tool Cleaning.
8. Existing railings, stairs, and hoist rails shall be prepared by removing loose paint and rust per SSPC-SP11 power tool cleaning to bare metal. Mechanically abrade remainder of surfaces to roughen existing coatings. Clean per SSPC-SP1 Solvent Cleaning.
9. Other existing ferrous metal items in non-immersion conditions to be painted shall be abrasive blasted to remove all existing coatings in accordance with SSPC-SP-6 Commercial Blast Cleaning or NAPF 500-03-04 Abrasive Blast Cleaning.
10. Existing ferrous metal in immersion conditions to be painted shall be abrasive blasted to remove all existing coatings in accordance with SSPC-SP10 Near White Blast Cleaning or NAPF 500-03-04 Abrasive Blast Cleaning.
11. Prior to finish coating, all primed areas that are damaged shall be cleaned and spot-primed.

C. Existing Concrete and Concrete Block:

1. All previously coated walls and ceilings of concrete and concrete block of existing structures, except as noted, shall be pole-sanded and hand-sanded to remove all old peeling paints as well as roughen-up existing paints.
2. All concrete and precast concrete walls, floor, and ceiling which are not currently painted but are scheduled for painting shall be abrasive-blasted in accordance with SSPC-SP13/NACE No. 6. Abrasive blasting of concrete shall result in a texture similar to 40-60 grit sandpaper (ICRI SP3-5).
3. Concrete floors containing oil and grease residues shall be cleaned with detergent to remove all residues and allowed to dry.
4. Bug holes, pits, voids, and cracks that are opened up shall be filled with an appropriate filler.
5. Paint manufacturer shall observe and approve the surface preparation method and the prepared surface prior to painting.
6. After cleaning, the surface shall be washed, and all dust, sand, and loose particles shall be removed by vacuuming. If CONTRACTOR elects to blow the surfaces off with air, it shall be oil-free air, and the methods shall conform to OSHA requirements.

D. PVC and CPVC: All PVC and CPVC to be painted shall be solvent-cleaned in accordance with SSPC-SP1 and shall be lightly sanded.

E. Dust Controls:

1. All motors, pumps, mechanical equipment, and electrical controls shall be wrapped in 6 mil opaque plastic sheeting and taped in place with 3-inch-wide tape where abrasive blasting or spray coating application is being performed. Cooling air shall be provided.
2. Plastic sheeting shall be provided with continuous filtered clean air supply to create a positive pressure relative to surrounding spaces.

F. Abrasive-Blast Residue Disposal:
1. All abrasive-blast residue for areas where paint contains significant amounts of lead or chromium shall be collected and stored in a bulk refuse container(s).
   a. Bulk refuse container(s) shall be lined with a waterproof impervious plastic liner to prevent spilling.
   b. Bulk refuse container(s) shall be protected by a waterproof cover to prevent rainwater from entering the container.
   c. The abrasive-blast residue shall be kept separate from all other waste for the project.
   d. Construction waste shall be kept separate from abrasive-blast residue.
2. The above blast-residue shall be disposed of by CONTRACTOR.
   a. Cost of the container procurement and placement at the site shall be by CONTRACTOR.
   b. Cost of testing of the containers for heavy metals, known as the Toxicity Characteristic Leaching Procedure (TCLP) shall be by CONTRACTOR.
   c. Cost of removal and disposal of the residue shall be by CONTRACTOR.
   d. Payment of container procurement, placement at the site, testing, removal, and disposal will be made from the allowance in the Bid.
   e. OWNER will assist CONTRACTOR to manifest and ship the waste container(s).
3. Construction debris other than the abrasive-blast residue shall be collected separately from the residue and removed from the site by CONTRACTOR. Cost of construction waste disposal shall be by CONTRACTOR. Collection of abrasive-blast residue in accordance with item K is only required for material used to blast existing piping and equipment identified as being painted with materials with significant amounts of lead or chromium. All other blast media shall be disposed of by CONTRACTOR in accordance with applicable regulations.

3.02 APPLICATION

A. All materials shall be used as specified by the manufacturer's published data sheets and label directions.

B. No paint shall be applied on a wet or damp surface and in no case until the preceding coat is dry and hard. Each coat shall be allowed to dry in accordance with manufacturer's data sheets before the next coat is applied.

C. Drying time shall be construed to mean "under normal conditions." Where conditions are other than normal because of the weather or because painting must be done in confined spaces, other drying times will be necessary.

D. Additional coats of paint shall not be applied, nor shall units be returned to service until paints are thoroughly dry and cured.

E. Steel that will be inaccessible in the completed work shall receive the final coat before enclosure.

F. Paint shall be applied to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, or other surface imperfections will not be acceptable. Tops and bottoms of walls and areas that are "cut-in" by brush prior to rolling shall have a uniform appearance in comparison with adjoining surfaces.

G. Concrete block walls shall be back-rolled to achieve a pinhole-free surface coat.

H. Walls and ceiling surfaces shall receive a minimum of one coat of paint before surface-mounted items such as conduits, boxes, piping, etc., are installed on these surfaces.

I. Crevices and other hard-to-apply areas shall be back-rolled/back-brushed in conjunction with application of the first field coat of primer or intermediate coat. This includes, but is not limited to, between pipe flanges, pipe flange/pipe barrel joints, equipment fittings, and other narrow openings.

J. No paint shall be applied to new or existing surfaces until joints have been caulked according to Section 07900 requirements, except at moving joints which shall be finish-painted before caulking or caulking shall be protected during painting.

K. For PVC and CPVC piping, unions and valves shall not be painted.

3.03 FIELD QUALITY CONTROL

A. Examination of work on the site by the manufacturer's representative shall be performed when requested by ENGINEER.

3.04 CLEANING

A. All stains and marks shall be removed from other surfaces upon completion of the work.

3.05 SCHEDULE

A. General:
   1. At the completion of the project, all painted surfaces which have been damaged shall be repainted or touched-up.
   2. See notes on the drawings for an additional reference for areas to be painted.
   3. The painter shall use some discretion in what should and should not be painted. Do not paint over labels and other information, bronze, machined surfaces, moving parts where painting may impair movement, hot surfaces which may peel, etc. If in doubt whether a part should be painted, ask ENGINEER.
   4. Products listed first are Tnemec and second are Sherwin Williams.

B. New Work:

1. All new work done by all trades shall be painted by CONTRACTOR in accordance with the following schedule and in accordance with paint manufacturer's recommendation. It is the intent of these specifications that all non-galvanized ferrous metal items scheduled for painting be shop-primed. If items are not shop-coated, surfaces shall be prepared and painted in the field as specified. If any items of new construction are not listed, CONTRACTOR shall request paint system from ENGINEER, and the items shall be painted as part of this Contract without additional cost.
2. Interior concrete block walls:One filler coat of Epoxoblock WB 1254, Kem Cati-Coat HS, and two coats HB Tneme-Tufcoat 114, Pro Industrial Water Based Epoxy B73-300.

   Note: Paint shall be roller- or brush-applied to concrete sound-absorptive block.

3. Interior concrete walls:
   a. One filler coat (1/16-inch minimum thickness) Mortarclad 218, Corobond 300.
   b. Two coats of WB Tneme-Crete 180, Pro Industrial Water Based Epoxy B73-300.

   Note: Interior face of concrete tank walls and floors channels and pipe trenches are not to be painted.

4. All exposed concrete ceilings (ceilings of water-containing tanks are not considered exposed):Two coats of HB Tneme-Tufcoat 114, Pro Industrial Water Based Epoxy B73-300.
5. Cast or ductile iron; not submerged or buried (including pipes to be insulated):
   a. One shop coat of N69-1255 Hi-Build Epoxoline, Macropoxy 646 Beige as primer;
   b. Touch-up prime coat prior to finish coating; and apply either:
      (1) Two coats of N69 Hi-Build Epoxoline II, Macropoxy 646 for interior surfaces, or
      (2) One coat of N69 Hi-Build Epoxoline II, Macropoxy 646, and one coat of 1074 Endura-Shield, Acrolon 218HS for exterior surfaces.
6. Cast or ductile iron, tar coated; buried:Not painted.
7. Cast or ductile iron,submerged:
   a. One shop coat Series 1 Omnithane (N140 or N69-1255 Epoxoline), Dura-Plate 235 Beige as primer.
   b. Touch-up prime coat prior to finish coating; and two coats of Series N69-Hi-Build Epoxoline II, Dura-Plate 235.
8. Steel, machinery, and equipment; not submerged (including pipes to be insulated):
   a. One shop coat of N69-1255 Hi-Build Epoxoline, Macropoxy 646 Beige as primer.
   b. Touch-up primer prior to finish coat, and either:
      (1) Two coats of N69 Hi-Build Epoxoline II, Macropoxy 646 for interior surfaces; or
      (2) One coat of N69 Hi-Build Epoxoline II, Macropoxy 646; and one coat of 1074 Endura-Shield, Acrolon 218HS for exterior surfaces.
9. Motors, gear drives, and doors delivered with nonepoxy primers:
   a. Degrease per SSPC-SP1.
   b. Lightly hand-sand per SSPC-SP2.

c. Apply one coat 135-1255 Chembuild Beige, Macropoxy 646 Beige.
d. Apply two finish coats as follows:
(1) Two coats of N69 Hi-Build Epoxoline II, Macropoxy 646 for interior surfaces, or
(2) One coat of N69 Hi-Build Epoxoline II, Macropoxy 646, and one coat of 1074 Endura-Shield, Acrolon 218HS for exterior surfaces.

10. Steel, machinery, and equipment, submerged:
a. One shop coat Series 1 Omnithane (N140 or N69-1255 Epoxoline), Dura-Plate 235 Beige as primer.
b. Touch-up prime coat prior to finish coating, and two coats of Series 446 Perma-Shield MCU, Dura-Plate 235.
11. Galvanized(except for metal building framing), copper, brass, CPVC, and PVC; not submerged or buried:
a. One coat of N69-1255 Hi-Build Epoxoline II, Macropoxy 646, and either:
b. Two coats of N69 Hi-Build Epoxoline, Macropoxy 646 for interior surfaces, or
c. One coat of N69 Hi-Build Epoxoline, Macropoxy 646, and one coat of 1074 Endura-Shield, Acrolon 218HS for exterior surfaces.
12. Insulation of equipment, pipes, and ductwork:
a. Two coats of Series 6 Tnemec-Cryl, DTM Acrylic B66100.
b. Colored PVC jacketing shall not be painted.
13. Galvanized, copper, CPVC, and PVC; submerged or buried:Not painted.
14. Aluminum items:
a. Exposed areas of structural items such as railings and grating shall not be painted.
b. For structural items in contact with concrete, apply at least 2 coats of alkali-resistant bitumastic Sherwin Williams Targuard or equal; each coat to be 8 to 14 mils dry film thickness.
15. Stainless steel:Not painted.

C. Existing Areas: Existing areas damaged by removal of existing work and/or installation of new work shall be repainted to match existing and in accordance with the schedule for new work. Existing equipment and structures shall be painted in accordance with the following schedule, or as noted on the drawings.
1. PVC and plastic piping:
a. Hand sand.
b. Solvent clean.
c. Coat in accordance with item 13 of new work.
2. Ductile iron piping:
a. Remove existing coating and prepare as specified.
b. Coat in accordance with items 5 or 7 of new work with shop primer replaced by field primer.
3. Steel handrails, stairs-interior, monorails, lintels, etc.:
a. Remove all existing coatings and prepare as specified.
b. Prime and coat per new item 8.
4. Precast and Cast-in-Place Concrete Walls and Ceilings–Interior which remain exposed and are currently painted.
a. Prepare as specified.
b. Coat in accordance with items 3 or 4 of new work.

5. Precast and cast-in-place concrete and concrete block walls, ceilings, and floors which are currently unfinished.
   a. Prepare as specified.
   b. Coat per new items 2, 3, or 4.
6. Interior concrete block walls which are currently painted and remain exposed:
   a. Prepare and overcoat as specified.
   b. Provide spot masonry filler coat as needed and two finish coats per Item 2 of new work.
7. Insulation of Equipment and Pipes: Prepare and coat per new item 12.

D. Coverage:
1. Dry mil thickness shall conform to those specified. Mil test measurement shall conform to SSPC Steel Structures Painting Manual. Dry Film Thickness (DFT) shall be verified in accordance with SSPC-PA2.
2. The coatings listed will provide the mil thickness given when applied at the coverages listed. Upon the request of ENGINEER, such surfaces shall be checked by the painter with a calibrated mil thickness gauge and any deficiencies found in the film shall be remedied by additional coat(s) at the expense of CONTRACTOR.
3. On 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, it shall be the painter's responsibility to achieve a protective and decorative pinhole-free finish either by decreasing the coverage rate or by applying additional coats of paint.
4. Coverages reflect manufacturer's recommendations using spray application techniques. Where brushing or rolling is specified or performed at the discretion of the painter, one additional coat, minimum, will be required to achieve total DFT thickness as specified and recommended by the manufacturer.

	Sq. Ft.** Coverage	Dry Mil** Thickness Per Coat
Products		
6 Tnemec-Cryl, DTM Acrylic B66100	200	
N69 Hi-Build Epoxoline II, Macropoxy 646		
Steel or Impervious Substrate Primer Coat	---	4.0
Steel or Impervious Substrate Intermediate Coat(s)	---	5.0
Steel or Impervious Substrate Finish coat	---	5.0
135-1255 Chembuild, Macropoxy 646	335	4.0
Steel Doors	---	3.0
140 Pota-Pox Plus, Macropoxy 646 NSF		
Steel or Impervious Substrate Primer	---	4.0
Steel or Impervious Substrate Intermediate Coat(s)	---	5.0
Steel or Impervious Substrate Finish Coat	---	5.0
1074 Endura-Shield II, Acrolon 218HS	---	2.5
201 Epoxoprime, ArmorSeal 1000 HS Epoxy	250	
280 Tneme-Glaze, ArmorSeal 1000 HS Epoxy	250	
Epoxoblock WB 1254, Kem Cati-Coat HS	80	
HB Tneme-Tuffcoat 114, Pro Industrial Water Based Epoxy B73-300	200	

	Sq. Ft.** Coverage	Dry Mil** Thickness Per Coat
Products		
Series1 Omnithane, DuraPlate 235 (Primer)		3.0, 5.0
N69 HI-Build Epoxoline, Dura-Plate 235 (Submerged)		6.0
WB Tneme-Crete 180, Sher-Cryl HPA	150	
Sherwin-Williams Products		
ProMar 200 Primer (sprayed)	200	
ProMar200 Primer (rolled/brushed)	260	
ProMar 200 Enamel (sprayed)	280	
ProMar 200 Enamel (rolled/brushed)	360	
A 100 Alkyd Wood Primer (sprayed)	200	
A 100 Alkyd Wood Primer (rolled/ brushed)	260	
A 100 Satin Latex Trim (sprayed)	280	
A 100 Satin Latex Trim (rolled/ brushed)	360	
S-W Wood Classics Stain (sprayed)	390	
S-W Wood Classics Stain (rolled/brushed)	480	
S.W. Wood Classics Varnish (sprayed)	320	
S.W. Wood Classics Varnish (rolled/brushed)	360	

** Roller or brush application requires two or more coats to obtain recommended film thickness. No allowance is made here for overspray, waste in handling, mixing, or application. Final total dry film thickness (DFT) shall be equal to that specified. Paint submittals shall note where roller or brush application is proposed and the paint manufacturer's recommendations of number of coats to achieve the required thickness shall be noted.

Primer, intermediate and/or final surface colors shall be of contrasting colors to assure coverage.

E. Pipe Colors:
1. All process piping shall be painted gray ANSI 70; wrap-around plastic labels shall be attached to each pipe with pipe names and label spacing per OWNER.

F. Wall Colors: All building walls and ceilings that are modified by the Work or shown to be painted shall be painted dark gray (lower 4 feet) and white (rest of walls and ceilings). Where noted on drawings to be painted, all materials mounted to walls and ceilings shall be painted according to schedule for new work, subject to discretion noted in 3.05.A.3.

G. Shop Finish Painting: The following items shall have factory-applied finishes and will not require field painting. CONTRACTOR shall field touch-up any damaged areas with factory-provided touch-up coating.
1. Screens and accessories.
2. Screening washer compactors and accessories.
3. Control panels.

END OF SECTION

SECTION 11000

Screens & Washer / Compactors Shop Drawings

See enclosed Flash Drive.

END OF SECTION

SECTION 15050

BASIC MECHANICAL MATERIALS AND METHODS

PART 1 GENERAL

1.1 WORK INCLUDES

A. Those items specified herein which are required to properly install, adjust and place in operation equipment or systems specified and more fully defined in the various sections of these specifications.

1.2 DESCRIPTION OF WORK

A. The work to be performed under this Division shall include all labor, materials, equipment, transportation, construction plans and facilities necessary to provide complete and satisfactory systems ready to use.

1.3 SUBMITTALS

A. The Contractor shall submit for approval, as required in the various sections of the specifications, detailed shop drawings of all equipment and all material required to complete the project. No material or equipment shall be delivered to the job site or installed until the Contractor has in his possession the approved shop drawings for that particular material or item of equipment. The shop drawings shall be submitted as described herein.

B. Prior to delivery of any material to the job site, and sufficiently in advance of requirements to allow the Engineer ample time for checking, submit for approval detailed, dimensioned drawings or cuts, showing construction, size, arrangement, operating clearances, performance characteristics, and capacity.

C. Samples, drawings, specifications, and catalogs submitted for approval shall be properly labeled indicating specific service for which material or equipment is to be used, section and article number of Specifications governing, Contractor's name, and name of job.

D. Catalogs, pamphlets, or other documents submitted to describe items on which approval is being requested shall be specific and identification in catalog, pamphlet, etc. of item submitted shall be clearly made in ink. Data of a general nature will not be accepted.

E. Approval rendered on shop drawings shall not be considered as a guarantee of measurements or building conditions. Where drawings are approved, said approval does not mean that drawings have been checked in detail; said approval does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the Contract Drawings and Specifications.

F. Failure of the Contractor to submit shop drawings in ample time for checking shall not entitle him to an extension of contract time, and no claim for extension by reason of such default will be allowed.

1.4 QUALITY ASSURANCE

A. All materials and equipment furnished shall be new and to the extent possible, standard products of the various manufacturers except where special construction or performance features are called for. Where more than one of any specific item it required, all shall be on the same type and manufacturer.

B. The product of specified acceptable manufacturers shall be acceptable only when that product complies with, or is modified as necessary to comply with, all specified and indicated requirements.

C. Materials and equipment not herein specified, or indicated as to manufacturer, but necessary for complete functioning systems, shall be provided from sources conforming to the quality levels and functional requirements for corresponding materials and equipment set forth herein.

1.5 INTENT

A. It is the intent of the Mechanical Division of these Specifications that all mechanical work specified herein be coordinated as required with the work of all other Divisions of the Specifications and the Drawings so that all installations shall operate as designed. All systems shall be completely assembled, tested, adjusted and demonstrated to be ready for operation to the satisfaction of the Engineer before acceptance by the Owner.

B. Should there be any doubt or obscurity as to the full intent of this Specification or the meaning of any schedule, drawings or other documents forming part of the Contract documentation then this shall be identified by the Contractor and clarification obtained via the Engineer prior to submission of a Bid.

C. In the event that such conflicting information is not brought to the attention of the Engineer during the bidding period then it shall be deemed that the Bid price includes for any alternative, and under these circumstances the Engineer shall give appropriate instructions at the time the clarification is sought and the relevant work shall be completed at no additional cost to the Owner.

D. Minor details not usually shown or specified, but necessary for the proper installation and operation shall be included in the Work as if herein specified or shown.

1.6 REGULATORY AGENCIES, CODES AND STANDARDS

A. Governing federal, state, local governmental laws, ordinances, referenced codes and standards constitute the minimum requirements of the Contract Documents.

B. The Contractor shall include in the Work, without extra cost to the Owner, any labor, materials, services, apparatus, drawings, in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on the drawings and/or specified.

C. Portions or all certain recognized industry or association standards referred to herein as being a requirement of these Specifications shall be considered as binding as though reproduced in full herein. Unless otherwise stated the referenced standard shall be the standard which is current as of the date of issuance of these Specifications. Reference

may be made to standards either by full name or for the sake of brevity by letter designation as follows:

AABC	Associated Air Balance Council
AMCA	Air Moving & Conditioning Association
ANSI	American National Standards Institute
ARI	Air-conditioning & Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating, and Air-conditioning Engineers, Inc.
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing of Materials
AWWA	American Waterworks Association
AWS	American Welding Society
BOCA	Building Officials & Code Administrators
FM	Factory Mutual Engineering Corporation
IBR	Institute of Boiler and Radiator Manufacturers
JIC	Joint Industry Council
NBBPVI	National Board of Boiler & Pressure Vessel Inspectors
NBS	National Bureau of Standards
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NPC	National Plumbing Code
OSHA	Occupational Safety and Health Administration
SMACNA	Sheetmetal & Air-conditioning Contractors National Assoc., Inc.
UL	Underwriters Laboratories, Inc.

1.7 SPACE PREFERENCE

A. Contractor shall carefully check and coordinate the location and level of all lines. Contractor shall run preliminary levels and check with all other contractors so that conflict in location may be avoided.

B. If conflicts occur, the following preference shall be followed:
   1. Sanitary drainage
   2. Light Fixtures
   3. Ductwork
   4. Domestic water, storm sewer, & vent lines
   5. Electrical conduits

C. No other work shall have preference over plumbing lines below fixtures.

D. No mechanical equipment shall be installed in dedicated space above switchgear and panels as defined in the latest version of NFPA 70.

E. No piping conveying fluids shall be installed directly over electrical equipment.

1.8 INTERRUPTION OF SERVICES

A. If existing buildings are to be occupied and maintained in normal use by the Owner during the progress of these contracts, Contractor shall arrange his work to reduce to the minimum the period of interruption or outages in various services.

B. If it is necessary to do this work after hours to avoid undue inconvenience to the Owner, no extra payment will be made.

C. Contractor shall notify the Owner and/or the Engineer indicating the extent of the work to be done during the outage, the probable length of time required for that phase of the work and the desired time at which the outage is to begin. The Owner will make all arrangements with the departments affected and where necessary, dictate and specify the time of beginning and other regulations governing each particular outage, so that inconveniences to the occupants will not be intolerable. Contractor requests for outages shall be made at least 7 days in advance of the planned work.

1.9 DRAWINGS

A. The layout shown on the Drawings is necessarily diagrammatic but shall be followed as closely as actual construction and as other work will permit. Changes from these Drawings required to make this Work conform to the building construction or other Work of other trades shall be made by this Contractor without additional cost to the Owner, however, only with the prior approval of the Engineer.

1.10 CORRECTED DRAWINGS

A. The Contractor shall, during the progress of the Work, record any and all changes or deviations from the original Drawings and layout of the Work. The Contractor shall locate and record critical dimensions of buried or concealed Work. At the Completion of the project the Contractor shall deliver to the Engineer two full size blueline marked up sets of “As-built” Drawings.

1.11 EQUIPMENT DEVIATIONS

A. Where the Contractor proposes to use an item of equipment other than that specified or detailed on the Drawing which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrical or architectural layout, all such redesign and all new drawings and detailing required shall be prepared by the Contractor at his own expense and approved by the Engineer.

B. Where such approved deviation requires a different quantity and arrangement of ductwork, piping, wiring, conduit and equipment from that specified or indicated on the Drawings, the Contractor shall furnish and install any such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit and any other additional equipment required by the system at no additional cost to the Owner.

1.12 QUIET OPERATION AND VIBRATION

A. All equipment and systems shall operate under all conditions of load without any sound or vibration which is objectionable in the opinion of the Engineer. In the case of moving

machinery, sound or vibration noticeable outside of the room in which it is installed, or annoyingly noticeable inside its own room will be considered objectionable. Also objectionable will be excessive vibration which puts, in the opinion of the Engineer, undo stress on piping or other appurtenances connected to the machinery. Sound or vibration conditions considered objectionable by the Engineer shall be corrected in an approved manner by the Contractor at his expense. Vibration control shall be by means of approved vibration eliminators in a manner as recommended by the manufacturer of the eliminators.

1.13 VISITING THE SITE

A. The Contractor shall visit the site and determine all existing local conditions affecting work in his contract. He shall examine the Drawings and Specifications to familiarize himself with the type of construction to be used for all new work and how it will affect the installation of work in his contract.

B. Failure to visit the site, or to determine existing conditions or the nature of new construction, will not be considered a basis for the granting of additional compensation.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION

3.1 PAINTING AND FINISHING

A. All equipment shall have a factory-applied standard finish of the manufacturer's standard color unless otherwise specified.

B. Equipment which will be subject to abnormal conditions of high temperature and corrosive environment shall have finishes and/or protective coatings suitable for the service as noted on the Drawings and/or in the Specifications.

C. Finishes which are marred during shipping, handling or installation shall be touched up to match the original finish.

D. Field fabricated bare iron or steel items required for installation of work under this Division shall have rough or sharp edges removed, be thoroughly cleaned of dirt, rust, weld slag, grease or oil and be painted with one coat of rust inhibiting metal primer as a requirement under this Division.

3.2 EQUIPMENT INSTALLATION

A. Install equipment according to approved submittal data.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components, unless otherwise indicated.

C. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations.

3.3 WATERPROOFING

A. Where any work pierces waterproofing, including waterproof concrete, the method of installation shall be as approved by the Engineer before work is done. Provide all necessary sleeves, caulking and flashing required to make openings absolutely watertight.

3.4 DEMOLITION

A. Demolition and removal shall be as shown on the Drawings.

3.5 LUBRICATION AND TOOLS

A. Provide a fresh charge of lubricant in accordance with the manufacturer's recommendations to all equipment requiring lubrication prior to start-up and maintain lubrication as required until acceptance by the Owner.

B. Provide for each piece of equipment one set of special tools required for the operation or adjustment of the equipment.

3.6 OPERATION AND MAINTENANCE MANUAL FOR MECHANICAL SYSTEMS

A. Bind the Operation and Maintenance Manual for Mechanical Systems in a hard-backed binder and appropriately label spine of binder.
   1. Provide a master index at the beginning of the manual showing items included. Provide a section for each piece of equipment.
   2. Submit 3 copies of operation and maintenance manual to Engineer for approval.
   3. The first section shall consist of name, address and telephone number of the Installing Contractor, each Sub-Contractor, each Equipment Supplier, and all Accessories Suppliers.

B. Operating instructions shall include:
   1. General description of each mechanical system.
   2. Schematic control diagrams for each mechanical system and electrical system.
   3. Drawing of each control panel identifying components and their function.

C. Maintenance instructions shall include manufacturer's maintenance instructions for each piece of mechanical equipment.

3.7 INSTRUCTIONS TO OWNER

A. Prior to final acceptance the Contractor shall instruct the Owner, or his representatives in the operation and maintenance of the systems installed.

B. Contractor and appropriate sub-contractors shall be present during equipment start-up, manufacturer start-up, testing, and training.

C. All switches, controls, valves, and safety devices shall be clearly and permanently marked with embossed or printed plates as to purpose and operation.

END OF SECTION

SECTION 15140

SUPPORTS, HANGERS, & SLEEVES

PART 1 GENERAL

1.1 SUMMARY

A. Provide hangers, supports, anchors, saddles, shields, sleeves, etc. to execute these works.

1.2 REFERENCES

A. American Society of Mechanical Engineers, ASME:
   1. ASME B31.1 – Power Piping
   2. ASME B31.9 – Building Services Piping

B. American Society for Testing Materials, ASTM:
   1. ASTM F708 – Design and Installation of Rigid Pipe Hangers.

C. Manufacturers Standardization Society of the Valve and Fitting Industry, MSS:
   1. MSS SP58 – Pipe Hangers and Supports - Materials, Design and Manufacturer.
   2. MSS SP69 – Pipe Hangers and Supports - Selection and Application.
   3. MSS SP89 – Pipe Hangers and Supports - Fabrication and Installation Practices.

1.3 REGULATORY REQUIREMENTS

A. Conform to all applicable codes for supporting of all products and systems.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Hangers and Supports:
   1. ITT Grinnell Corp.
   2. B Line Systems Inc.
   3. ATO Inc./Fee & Mason Mfg. Co.

B. Saddles and Shields:
   1. Fee & Mason Mfg. Co.
   2. Pipe Shields, Inc.
   3. B-Line Systems Inc.

2.2 PIPING HANGERS, SUPPORTS, CLAMPS, BUILDING ATTACHMENTS, CONCRETE INSERTS, EXPANSION ANCHORS, AND HANGER ROD ATTACHMENTS

A. Provide factory-fabricated components in compliance with MSS SP-58 and MSS SP-69.

B. Select matching components sized to exactly fit pipe size for bare piping or to exactly fit around pipe insulation with saddle and shield for insulated piping.

C. Use only one type by one manufacturer for each piping service.

D. Provide copper plated components for copper piping systems.

E. Type:
1. Adjustable Steel Clevises: MSS, Type 1.
2. Four Bolt Riser Clamps: MSS, Type 42.
3. Steel Turnbuckles: MSS, Type 13.
4. C Clamps: MSS, Type 23.

F. Steel Brackets:
1. Light Duty: MSS, Type 31.
2. Medium Duty: MSS, Type 32.
3. Heavy Duty: MSS, Type 33.

2.3 SADDLES AND SHIELDS

A. Provide factory fabricated correctly sized saddles or shields under piping hangers and supports for all insulated piping.

B. Types:
1. Protection Saddles: MSS Type 39; fill interior voids with segments of insulation matching adjoining insulation.
2. Protection Shields: MSS Type 40; length recommended by manufacturer to prevent crushing insulation.
3. Thermal Hanger Shields:
   a. Constructed of 360-degree insert of high density, 100 psi, waterproofed calcium silicate, encased in 360-degree sheet metal shield.
   b. Provide assembly of same thickness as adjoining insulation.

2.4 INSERTS AND EXPANSION ANCHORS

A. Concrete inserts, cast insert nuts, insert knockouts, and sport type inserts shall be provided by the Contractor providing and installing the pipe. All hardware materials shall be Type 316 stainless steel.

2.5 SLEEVES

A. Pipes through floors where no plumbing fixtures are installed: Type 316 stainless steel.

B. Pipes through beams, walls, fireproofing, footings, or potentially wet floors: Schedule 10 stainless steel pipe.

C. UL Labeled Sleeves: Prefabricated with insulation and fireproofing.

D. Sleeves through Fire and Smoke Walls: NFPA 90A.

E. Size sleeves to allow for installation of link seals between pipe and sleeve.

F. Contractor shall furnish wall and floor penetration locations for pipe/duct systems to General Contractor for coordination into his works. General Contractor will provide all penetrations in new work.

2.6 MISCELLANEOUS SUPPORT MATERIALS

A. Metal Framing: NEMA Standard ML 1.

B. Steel Plates, Shapes, and Bars: ANSI/ASTM A36.

C. Hanger Rods: Type 316 Stainless Steel; threaded to fit application.

D. Heavy Duty Stainless Steel Trapeze Hangers:

E. Fabricate from stainless steel shapes selected for full pipe loads.

F. Weld stainless steel in accordance with AWS standards.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Comply with MSS SP-69 for installation of hangers, supports, anchors, and inserts.

3.2 INSERTS

A. Provide inserts for placement in concrete formwork.

B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Support horizontal piping as shown on the following page:

PIPE SIZE Inches	MAX. SPACING Feet (Metal Pipe)	ROD DIAM. Inches	MAX. SPACING Feet (Plastic Pipe)
1/2 to 1-1/4	6	3/8	3
1-1/2 to 2	8	3/8	5
2-1/2 to 4	10	1/2	8
6 or Over	15	5/8	8

D. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

E. Place hangers within 12 inches of each horizontal elbow.

F. Use hangers with 1-1/2 inch minimum vertical adjustment.

G. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.

H. Support vertical piping. Support vertical cast iron pipe at hub.

I. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

J. Support riser piping independently of connected horizontal piping.

K. Provide copper plated hangers and supports for copper piping.

L. Design hangers for pipe movement without disengagement of supported pipe.

3.3 PIPE HANGERS

A. Perforated strap hangers are not acceptable.

B. Pipe Guides: Install pipe guides near expansion loop, expansion joints, and ball joints, unless indicated otherwise.

C. Steel Joists: Connect all hangers and attachments to bottom chord of all steel joists and beams.

D. Clamps:
1. Attach clamps, including spacers, to piping with clamps projecting through insulation. Do not exceed ASME B31 pipe stresses.

E. Shields:
1. Where low-compressive-strength insulation vapor barriers are specified on cold or chilled water piping, install coated protective shields.
2. For pipe 8 inches or over, install wood block supports and shields.
3. Where insulation without vapor barrier is indicated, install protection saddles.

3.4 BUILDING ATTACHMENT INSTALLATION

A. Space attachments within maximum piping span indicated in MSS SP-69.

B. Install additional building attachments when supporting additional concentrated loads; including valves, flanges, strainers, expansion joints, and changes in pipe direction.

C. Anchors:
1. Install anchors at locations preventing stresses from exceeding ASME B31; and preventing transfer of loading and stresses to connected equipment.
2. Install anchors at ends of principal pipe-runs and at intermediate points in pipe-runs between expansion loops and bends.
3. Preset anchors to accommodate both expansion and contraction of piping.

D. Anchors for Expansion Compensators: Install anchors in accordance with expansion unit manufacturer’s recommendations.

3.5 FIRE AND SMOKE PENETRATION SEALANT

A. Where supports pass through fire-rated walls, partitions, floors, and ceilings, seal openings with UL rated materials.

3.6 EQUIPMENT BASES AND SUPPORTS

A. Contractor to provide reinforced concrete housekeeping bases for major equipment. Pour concrete bases directly on structural floor slab, 4 inches thick minimum, extended a minimum of 4 inches beyond equipment bedplates.

B. Provide templates, anchor bolts and accessories required for mounting and anchoring equipment.

3.7 FLASHING

A. Flash and counterflash where mechanical equipment passes through weather or waterproofed walls, floors, and roofs.

B. Outside Surfaces:
1. For pipes through outside walls, turn flange back into wall and caulk.

C. Curbs:
1. Flash and counterflash with steel, soldered and waterproofed.

3.8 ADJUSTING AND CLEANING

A. Adjust hangers and supports to bring piping and ductwork to correct levels and elevations.

B. Place grout under supports and equipment bases to bring supports and bases to correct levels, elevations, and alignment.

END OF SECTION

SECTION 15190

MECHANICAL IDENTIFICATION

PART 1 GENERAL

1.1 SUMMARY

A. Work Includes:
1. Nameplates.
2. Tags.
3. Pipe Markers.
4. Provide the above for all piping, air conditioning, and ventilating systems and components.

1.2 REFERENCES

A. ASME A13.1 - Scheme for the Identification of Piping Systems.

1.3 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 1. Record the actual locations of tagged valves.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable manufacturers:
1. WH Brady Co. Signmark Div.
2. Allen Systems, Inc.
3. Industrial Safety Supply Co.
4. Seton Nameplate Corp.

2.2 NAMEPLATES

A. Description: Laminated three-layer plastic with engraved black letters on light contrasting background color or white letters on dark contrasting background. Color scheme to match other existing nameplates in the building.

2.3 TAGS

A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter or square.

B. Chart: Typewritten letter size list in anodized aluminum frame with 1/32" (min) clear acrylic cover.

2.4 PIPE MARKERS

A. Color: Conform to ASME A13.1.

B. Plastic Pipe Markers: Factory fabricated, coiled flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

PART 3 EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

A. Install plastic nameplates with zip tie type mechanical fasteners or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain or plastic zip tie type fasteners..

C. Install plastic pipe markers in accordance with manufacturer's instructions.

D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

E. Identify control panels and major control components outside panels with plastic nameplates.

F. Identify valves in main and branch piping with tags.

G. Identify gas valves with numbered tags and pressure of gas.

H. Tag automatic controls, instruments, and relays. Key to control schematic.

I. Identify piping, concealed or exposed, with plastic pipe markers or plastic tape pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

SECTION 15410

PLUMBING

PART 1 GENERAL

1.1 WORK INCLUDES

A. Section includes:
1. Pipe and pipe fittings.
2. Valves.
3. Building water piping system.

B. Related Sections:
1. Section 15050 Basic Mechanical Materials And Methods.
2. Section 15140 Supports, Hangers, & Sleeves.
3. Section 15190 Mechanical Identification.
4. Section 15430 Plumbing Insulation

1.2 REFERENCES

A. The following Standards.
1. ANSI B31.9 - Building Service Piping.
ASME B16.22 - Wrought Copper and Bronze Solder-Joint Pressure Fittings
2. ASTM B32 - Solder Metal.
3. ASTM B42 - Seamless Copper Pipe.
4. ASTM B88 - Seamless Copper Water Tube.
5. ASTM B251 - Wrought Seamless Copper and Copper-Alloy Tube.
6. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
7. AWS A5.8 - Brazing Filler Metal.
8. CISPI 310 - Joints for Hubless Cast Iron Sanitary Systems.
9. NCPWB - Procedure Specifications for Pipe Welding.

1.3 QUALITY ASSURANCE

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Welding Materials and Procedures: Conform to ASME Code and applicable state labor regulations.

C. Welders Certification: In accordance with ASME Sec 9 or NCPWB Standard Procedure Specifications.

PART 2 PRODUCTS

2.1 WATER PIPING, ABOVE GRADE

A. Existing copper plant water piping shall be replaced with Schedule 80 PVC piping, valves, and fittings.

B. For materials not available in PVC, use Type 304 Stainless Steel with threaded fittings.

C. All water piping shall be insulated; refer to Section 15430.

2.2 DRAIN AND VENT PIPING – PVC

A. Existing cast iron drain and vent piping in the Lower Screen Room and where otherwise indicated shall be removed and replaced with Schedule 40 PVC piping.

B. PVC Pipe And Fittings: ASTM D1785, Schedule 40.
1. Fittings: ASTM D2466, Schedule 40 PVC and ASTM D2464 PVC, threaded.
2. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.
3. Connections to Existing Cast Iron Piping: Retain a straight section of existing cast iron pipe after the last fitting before a wall or ceiling/floor penetration. If last fitting is more than 4 feet from the wall or ceiling/floor penetration, saw cut pipe straight, bevel edges, and transition at this point.
4. Use Fernco shear ring type couplings with flexible PVC body, stainless steel bands, and stainless steel hardware.
5. Where new PVC piping will terminate into an existing cast iron hub, use a Fernco or equal flexible PVC compression ring.

2.3 BACKFLOW PREVENTERS

A. Manufacturers:
1. Febco
2. Watts Regulator
3. Zurn/Wilkins

B. Stainless steel backflow preventers shall be used with pipe size increased as necessary at the device to accommodate available sizes.

C. Reduced pressure chamber type, in accordance with AWWA C511.

D. Stainless steel ball valves for shut-off at each end of the backflow preventer. Dis-similar metals shall be isolated to prevent galvanic action.

2.4 BALL VALVES

A. Manufacturers:
1. Apollo
2. Watts

B. Up to and including 2 Inches: 150 psi SWP or 400 psi WOG, stainless steel three piece body, stainless steel ball, full port, PTFE seats and stuffing box ring, stainless steel stem, lever handle, solder or threaded ends.

C. Over 2 Inches: 125 psi SWP, iron body, bronze trim, stainless steel ball, full port, PTFE seats and stuffing box ring, stainless steel stem, lever handle, threaded or flanged ends.

D. Electric operated ball valves and valve actuators shall be by Belimo.

2.5 PLASTIC BALL VALVES

A. Acceptable Manufacturers, or Equal:
   1. George Fischer, Inc

B. General: Plastic ball valves for plant water piping shall be made of polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC), or polyvinylidene fluoride (PVDF), as recommended by the Manufacturer for any specific applications.
   1. All valves shall have manual lever actuators.

C. Construction: All plastic ball valves shall have union ends or flanged ends to mate with ANSI B 16.5, class 150, for easy removal.
   1. The balls shall have full size ports and Teflon seats. All body seals, union O-ring seals, and stem seals shall be Viton.
   2. The valves shall be suitable for a maximum working non-shock pressure of 150 psi at 73 degrees F for PVC, with decreasing ratings for higher temperatures and other plastics.

PART 3 EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient.

D. Install piping to conserve building space and not interfere with use of space.

E. Provide clearance for installation of insulation and access to valves and fittings.

F. Provide plastic labels on piping; refer to Section 15190.

G. Install valves with stems upright or horizontal, not inverted.

3.3 PROTECTION

A. Protect drains during construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of the day or when work stops.

3.4 INSPECTION AND TESTS

A. Hydrostatic tests shall be in accordance with the Illinois Plumbing Code – Latest Edition, for all systems except natural gas which shall be tested with air, CO2, or nitrogen in accordance with the Uniform Plumbing Code – Latest Edition. Test pressure shall be held for the duration indicated and until each joint has been inspected. Test pressures and durations shall not be less than the following:

SYSTEM	TEST PRESSURE	TEST DURATION
Sanitary waste	10 ft water head	1/2 hour
Domestic water	150 psig	4 hours

B. Cut out and repair joints and fittings found with seepage or leaks. Remove and replace all cracked or damaged pipe, fittings, valves, or otherwise defective materials found during tests. After repairs have been made, repeat tests until work is satisfactory.

END OF SECTION

SECTION 15430

PLUMBING INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Plumbing piping insulation, jackets, and accessories.
   2. Plumbing equipment insulation, jackets, and accessories.

B. Related Sections:
   1. Section 15050 Basic Mechanical Materials And Methods
   2. Section 15140 Supports, Hangers, & Sleeves
   3. Section 15410 Plumbing Piping.

1.2 REFERENCES

A. ASTM International:
   1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
   2. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
   3. ASTM C450 - Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging.
   4. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
   5. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.
   6. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).
   7. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
   8. ASTM D1785 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
   9. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. Underwriters Laboratories Inc.:
   1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

C. National Fire Protection Association:
   1. NFPA 255 – Standard method of Test of Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

A. Submit product description, thermal characteristics, and list of materials and thickness for each service, and location.

B. Submit manufacturers published literature indicating proper installation procedures.

1.4 QUALITY ASSURANCE

A. Test pipe insulation for maximum flame spread index of 25 and maximum smoke developed index of not exceeding 50, in accordance with ASTM E84, UL 723, and NFPA 255.

B. Pipe insulation manufactured in accordance with ASTM C585 for inner and outer diameters.

C. Factory fabricated fitting covers manufactured in accordance with ASTM C450.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging and labeled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and damage by storing in original wrapping.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Install insulation only when ambient temperature and humidity conditions are within range recommended by manufacturer.

B. Maintain temperature before, during, and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.1 GENERAL

A. All water piping shall be insulated for control of condensation.

B. All valves and fittings shall be equipped with Velcro type insulation fasteners to allow easy removal and re-installation in the future.

2.2 MANUFACTURER

A. Manufacturers for Glass Fiber Products:
   1. CertainTeed.
   2. Knauf.
   3. Johns Manville.
   4. Owens-Corning.
   5. Auburn Manufacturing, Inc.

B. Manufacturers for Closed Cell Elastomeric Insulation Products:
   1. Aeroflex. Aerocell.
   2. Armacell, LLC. Armaflex.
   3. Nomaco. K-flex.

2.3 PIPE INSULATION

A. TYPE P-1: ASTM C547, molded glass fiber pipe insulation.
   1. Thermal Conductivity: 0.23 at 75 degrees F.
   2. Operating Temperature Range: 0 to 850 degrees F.
   3. Vapor Barrier Jacket: ASTM C1136, Type I, factory applied reinforced foil kraft with self-sealing adhesive joints.
   4. Jacket Temperature Limit: minus 20 to 150 degrees F.

B. TYPE P-2: ASTM C534, Type I, flexible, closed cell elastomeric insulation, tubular.
   1. Thermal Conductivity: 0.27 at 75 degrees F.
   2. Operating Temperature Range: Range: Minus 70 to 180 degrees F.

2.4 PIPE INSULATION JACKETS

A. PVC Plastic Pipe Jacket:
   1. Product Description: ASTM D1785, One piece molded type fitting covers and sheet material, off-white color.
   2. Thickness: 15 mil.
   3. Connections: Brush on welding adhesive or Pressure sensitive color matching vinyl tape.

B. Aluminum Pipe Jacket:
   1. ASTM B209.
   2. Thickness: 0.016 inch thick sheet.
   3. Finish: Smooth.
   4. Joining: Longitudinal slip joints and 2 inch laps.
   5. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
   6. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

2.5 PIPE INSULATION ACCESSORIES

A. Vapor Retarder Lap Adhesive: Compatible with insulation.

B. Covering Adhesive Mastic: Compatible with insulation.

C. Piping 1-1/2 inches diameter and smaller: Stainless steel insulation protection shield. Length: Based on pipe size and insulation thickness.

D. Piping 2 inches diameter and larger: Wood insulation saddle, hard maple. Inserts length: not less than 6 inches long, matching thickness and contour of adjoining insulation.

E. Closed Cell Elastomeric Insulation Pipe Hanger: Polyurethane insert with aluminum single piece construction with self adhesive closure. Thickness to match pipe insulation.

F. Insulating Cement: ASTM C195; hydraulic setting on mineral wool.

G. Adhesives: Compatible with insulation.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify piping and equipment has been tested before applying insulation materials.

B. Verify surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION - PIPING SYSTEMS

A. Piping Exposed to View in Finished Spaces: Locate insulation and cover seams in least visible locations.

B. Continue insulation through penetrations of building assemblies or portions of assemblies having fire resistance rating of one hour or less. Provide intumescent firestopping when continuing insulation through assembly. Finish at supports, protrusions, and interruptions.

C. Piping Systems Conveying Fluids Below Ambient Temperature (plant water):
   1. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
   2. Furnish factory-applied or field-applied vapor retarder jackets. Secure factory-applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal staple penetrations with vapor retarder mastic.
   3. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor retarder adhesive or PVC fitting covers.

D. Inserts and Shields:
   1. Piping 1-1/2inches Diameter and Smaller: Install stainless steel shield between pipe hanger and insulation.
   2. Piping 2 inches Diameter and Larger: Install insert between support shield and piping and under finish jacket.
      a. Insert Configuration: Minimum 6 inches long, of thickness and contour matching adjoining insulation; may be factory fabricated.
      b. Insert Material: Compression resistant insulating material suitable for planned temperature range and service.
   3. Piping Supported by Roller Type Pipe Hangers: Install stainless steel shield between roller and inserts.

E. Insulation Terminating Points:
   1. Piping: Insulate entire piping system and components to prevent condensation.

F. Closed Cell Elastomeric Insulation:
   1. Push insulation on to piping.
   2. Miter joints at elbows.
   3. Seal seams and butt joints with manufacturer’s recommended adhesive.
   4. When application requires multiple layers, apply with joints staggered.
   5. Insulate fittings and valves with insulation of like material and thickness as adjacent pipe.

G. Pipe Exposed in Process/Mechanical Equipment Rooms or Finished Spaces: Finish with PVC jacket and fitting covers.

H. Piping Exterior to Building: Provide vapor retarder jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor retarder cement. Cover with aluminum jacket with seams located at 3 or 9 o'clock position on side of horizontal piping with overlap facing down to shed water or on bottom side of horizontal piping.

3.3 SCHEDULES

A. Water Supply Services Piping Insulation Schedule:

PIPING SYSTEM	INSULATION TYPE	PIPE SIZE	INSULATION THICKNESS inches
Domestic Cold Water	P-1 or P-2	< 3 inches 3 inches and larger	1.0 2.0

B. Drainage Services Piping Insulation Schedule:

PIPING SYSTEM	INSULATION TYPE	PIPE SIZE	INSULATION THICKNESS inches
Drain/Sanitary Sewer Piping (horizontal and vertical above ground within building when PVC piping is used)	P-1	< 3 inches 3 inches and larger	1.0 2.0

END OF SECTION

SECTION 16060

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Work of this section includes grounding and bonding of new equipment and panels.

B. Section Includes:
1. Wire.
2. Mechanical connectors.

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers:
1. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
2. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.

B. International Electrical Testing Association:
1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

C. National Fire Protection Association:
1. NFPA 70 - National Electrical Code.

1.3 PERFORMANCE REQUIREMENTS

A. Grounding System Resistance: 5 ohms maximum.

1.4 SUBMITTALS

A. Section 01330 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit data on grounding electrodes and connections.

C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

A. Section 01700 - Execution Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of components.

1.6 QUALITY ASSURANCE

A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing indoors and in original packaging.

C. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

PART 2 PRODUCTS

2.1 WIRE

A. Material: Stranded copper.

B. Bonding Conductor: Copper conductor bare.

2.2 MECHANICAL CONNECTORS

A. Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.

PART 3 EXECUTION

3.1 PREPARATION

A. Remove paint, rust, mill oils, surface contaminants at connection points.

3.2 EXISTING WORK

A. Extend existing grounding system using materials and methods compatible with existing electrical installations, or as specified.

3.3 INSTALLATION

A. Install in accordance with IEEE 142 and 1100.

B. Install grounding and bonding conductors concealed from view.

C. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

D. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting panelboards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.

E. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.

F. Permanently attach equipment and grounding conductors prior to energizing equipment.

3.4 FIELD QUALITY CONTROL

A. Section 01700 - Miscellaneous Requirements: Testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.

D. Perform ground resistance testing in accordance with IEEE 142.

E. Perform leakage current tests in accordance with NFPA 99.

F. Perform continuity testing in accordance with IEEE 142.

END OF SECTION

SECTION 16070

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Conduit supports.
2. Formed steel channel.
3. Spring steel clips.
4. Sleeves.
5. Mechanical sleeve seals.
6. Firestopping relating to electrical work.
7. Firestopping accessories.
8. Equipment bases and supports.

1.2 REFERENCES

A. ASTM International:
1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
3. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
4. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.

B. FM Global:
1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.

C. National Fire Protection Association:
1. NFPA 70 - National Electrical Code.

D. Underwriters Laboratories Inc.:
1. UL 263 - Fire Tests of Building Construction and Materials.
2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
3. UL 1479 - Fire Tests of Through-Penetration Firestops.
4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
5. UL - Fire Resistance Directory.

1.3 DEFINITIONS

A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.4 SYSTEM DESCRIPTION

A. Firestopping Materials: ASTM E119, ASTM E814, UL 263, UL 1479 to achieve fire ratings as noted on Drawings for adjacent construction, but not less than 1 hour fire rating.
   1. Ratings may be 3-hours for firestopping in through-penetrations of 4-hour fire rated assemblies unless otherwise required by applicable codes.

B. Firestop interruptions to fire rated assemblies, materials, and components.

1.5 PERFORMANCE REQUIREMENTS

A. Firestopping: Conform to applicable code for fire resistance ratings and surface burning characteristics.

1.6 QUALITY ASSURANCE

A. Through Penetration Firestopping of Fire Rated Assemblies: UL 1479 or ASTM E814 with 0.10 inch water gage minimum positive pressure differential to achieve fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
   1. Wall Penetrations: Fire F-Ratings as indicated on Drawings, but not less than 1-hour.
   2. Floor and Roof Penetrations: Fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
      a. Floor Penetrations Within Wall Cavities: T-Rating is not required.

B. Through Penetration Firestopping of Non-Fire Rated Floor and Roof Assemblies: Materials to resist free passage of flame and products of combustion.
   1. Noncombustible Penetrating Items: Noncombustible materials for penetrating items connecting maximum of three stories.
   2. Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.

C. Fire Resistant Joints in Fire Rated Floor, Roof, and Wall Assemblies: ASTM E1966 or UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.

D. Fire Resistant Joints Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10 inch water gage minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.

E. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing indoors and in original packaging.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Do not apply firestopping materials when temperature of substrate material and ambient air is below 60 degrees F.

B. Maintain this minimum temperature before, during, and for minimum 3 days after installation of firestopping materials.

C. Provide ventilation in areas to receive solvent cured materials.

PART 2 PRODUCTS

2.1 CONDUIT SUPPORTS

A. Hanger Rods: Threaded high tensile strength Type 316 stainless steel.

B. Beam Clamps: Type 316 stainless steel, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: Type 316 stainless steel.

C. Conduit clamps for trapeze hangers: Type 316 stainless steel, notched to fit trapeze with single bolt to tighten.

D. Conduit clamps - general purpose: One hole Type 316 stainless steel for surface mounted conduits.

E. Cable Ties: High strength nylon temperature rated to 185 degrees F. Self locking.

2.2 FORMED STEEL CHANNEL

A. Product Description: Stainless steel in Screen Rooms and Loading Area. Galvanized 12 gage thick steel in Control Room and Utility Room. Channel with holes at 1-1/2 inches on center.

2.3 SPRING STEEL CLIPS

A. Product Description: Mounting hole and screw closure, material of construction matching the channel material.

2.4 SLEEVES

A. Sleeves Through Non-fire Rated Floors: Schedule 10 stainless steel.

B. Sleeves Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.

C. Fire-stopping Insulation: Glass fiber type, non-combustible.

2.5 MECHANICAL SLEEVE SEALS

A. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation. Hardware to be Type 316 stainless steel.

2.6 FIRESTOPPING

A. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
   1. Silicone Firestopping Elastomeric Firestopping: Single component silicone elastomeric compound and compatible silicone sealant.
   2. Foam Firestopping Compounds: Single component foam compound.
   3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
   4. Fiber Stuffing and Sealant Firestopping: Composite of fiber stuffing insulation with silicone elastomer for smoke stopping.
   5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
   6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
   7. Firestop Pillows: Formed mineral fiber pillows.

2.7 FIRESTOPPING ACCESSORIES

A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.

B. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place made of Type 316 stainless steel.

C. General:
   1. Furnish UL listed products or products tested by independent testing laboratory.
   2. Select products with rating not less than rating of wall or floor being penetrated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify openings are ready to receive sleeves.

C. Verify openings are ready to receive firestopping.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

B. Remove incompatible materials affecting bond.

C. Install backing or damming materials to arrest liquid material leakage.

D. Do not drill or cut structural members.

3.3 INSTALLATION - HANGERS AND SUPPORTS

A. Anchors and Fasteners:
   1. Concrete Structural Elements: Provide precast inserts, expansion anchors, epoxy adhered anchors, and preset inserts.
   2. Steel Structural Elements: Provide beam clamps, spring steel clips, steel ramset fasteners, and welded fasteners.
   3. Concrete Surfaces: Provide self-drilling anchors, expansion anchors, and epoxy adhered anchors.
   4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Provide toggle bolts and hollow wall fasteners.
   5. Solid Masonry Walls: Provide expansion anchors, epoxy adhered anchors, and preset inserts.
   6. Sheet Metal: Provide sheet metal screws.

B. Inserts:
   1. Install inserts for placement in concrete forms.
   2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
   5. Where inserts are omitted, drill into concrete slab and provide epoxy adhered anchors.

C. Install conduit and raceway support and spacing in accordance with NEC.

D. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.

E. Install multiple conduit runs on common hangers.

F. Supports:
   1. Fabricate supports from stainless steel or formed stainless steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
   2. Install surface mounted cabinets and panelboards with minimum of four anchors.
   3. In wet and damp locations install channel supports to stand cabinets and panelboards 1 inch off wall.
   4. Support vertical conduit at every other floor.

3.4 INSTALLATION - FIRESTOPPING

A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.

B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.

C. Apply firestopping material in sufficient thickness to achieve required fire and smoke.

D. Place intumescent coating in sufficient coats to achieve rating required.

E. Remove dam material after firestopping material has cured.

F. Fire Rated Surface:
   1. Seal opening at floor, wall, partition, ceiling, and roof as follows:
      a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
      b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
      c. Pack void with backing material.
      d. Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.
   2. Where cable tray, bus, cable bus, conduit, wireway, trough, and penetrates fire rated surface, install firestopping product in accordance with manufacturer's instructions.

G. Non-Rated Surfaces:
   1. Seal opening through non-fire rated wall, partition floor, ceiling, and roof opening as follows:
      a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
      b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
      c. Install type of firestopping material recommended by manufacturer.
   2. Install escutcheons where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
   3. Exterior wall openings below grade: Assemble rubber links of mechanical seal to size of conduit and tighten in place, in accordance with manufacturer's instructions.
   4. Interior partitions: Seal pipe penetrations at clean rooms, laboratories, hospital spaces, computer rooms, telecommunication rooms, data rooms. Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit.

3.5 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

A. Provide housekeeping pads of concrete, minimum 4 inches thick and extending 6 inches beyond supported equipment. Refer to Section 03300.

B. Using templates furnished with equipment, install anchor bolts and accessories for mounting and anchoring equipment.

C. Construct supports of stainless steel members. Brace and fasten with flanges bolted to structure.

3.6 INSTALLATION - SLEEVES

A. Exterior watertight entries: Seal with adjustable interlocking rubber links.

B. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.

C. Set sleeves in position in forms. Provide reinforcing around sleeves.

D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

E. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.

F. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with fire stopping insulation and caulk airtight. Provide close fitting collar or escutcheon covers at both sides of penetration.

G. Install chrome plated steel escutcheons at dry finished surfaces.

3.7 FIELD QUALITY CONTROL

A. Section 01700 - Field inspecting, testing, adjusting, and balancing.

B. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.8 CLEANING

A. Section 01700 - Execution Requirements: Requirements for cleaning.

B. Clean adjacent surfaces of firestopping materials.

3.9 PROTECTION OF FINISHED WORK

A. Protect finished Work.

B. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 16123

BUILDING WIRE AND CABLE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes building wire and cable; and wiring connectors and connections.

1.2 REFERENCES

A. International Electrical Testing Association:
   1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

B. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.
   2. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

1.3 SYSTEM DESCRIPTION

A. Provide products as follows:
   1. All conductors shall be stranded copper, except for drops to outlets and switches which may be solid.
   2. Conductor not smaller than 12 AWG for power and lighting circuits.
   3. Conductor not smaller than 16 AWG for control circuits.
   4. Increase wire size in branch circuits to limit voltage drop to a maximum of 3 percent.

B. Wiring Methods: Provide the following wiring methods:
   1. Branch Circuits: Use only building wire, Type THHN/THWN insulation, in raceway.
   2. Feeders: Use only building wire, Type THHN/THWN insulation, in raceway.

1.4 SUBMITTALS

A. Comply with requirements for submittals in Section 01330 - Submittal Procedures.

B. Product Data: Submit for building wire and cable.

C. Test Reports: Indicate procedures and values obtained.

1.5 CLOSEOUT SUBMITTALS

A. See Section 01330 - Submittal Procedures

B. See Section 01700 - Miscellaneous Requirements.

1.6 QUALITY ASSURANCE

A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with NFPA 262.

1.7 COORDINATION

A. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.

PART 2 PRODUCTS

2.1 BUILDING WIRE

A. Conductor: stranded copper.

B. Insulation Voltage Rating: 600 volts.

C. Insulation Temperature Rating: 90 degrees C.

D. Insulation Material: Thermoplastic.

2.2 WIRING CONNECTORS

A. Factory fabricated wiring connectors of size, ampacity rating, material, type, and class for application and service indicated.

B. High pressure crimp connectors shall be used for #6 AWG and larger conductors. Connectors shall be color keyed with insulating sealing collars. Split bolt type connectors will not be acceptable.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify interior of building is adequately protected from weather.

B. Verify mechanical work likely to damage wire and cable has been completed.

C. Verify raceway installation is complete and supported.

3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.3 EXISTING WORK

A. Remove exposed abandoned wire and cable. Patch surfaces where removed cables pass through building finishes.

B. Disconnect abandoned circuits and remove circuit wire and cable. Remove abandoned boxes when wire and cable servicing boxes is abandoned and removed. Install blank cover for abandoned boxes not removed.

C. Provide access to existing wiring connections remaining active and requiring access. Modify installation or install access panel.

D. Extend existing circuits using materials and methods compatible with existing electrical installations, or as specified.

E. Clean and repair existing wire and cable remaining or wire and cable to be reinstalled.

3.4 INSTALLATION

A. Route wire and cable to meet Project conditions.

B. Neatly train and lace wiring inside boxes, equipment, and panelboards.

C. Run all wire in conduit, unless otherwise indicated in the Contract Documents.
   1. All analog wiring must be installed in a separate conduit system.
   2. All control wiring must be installed in a separate conduit system.
   3. All power and lighting wiring must be installed in a separate conduit system.

D. Identify and color code wire and cable following Owner standard and per this section. Identify each conductor with its circuit number or other designation indicated.

E. Special Techniques--Building Wire in Raceway:
   1. Pull conductors into raceway at same time.
   2. Install building wire 4 AWG and larger with pulling equipment.

F. Special Techniques - Cable:
   1. Protect exposed cable from damage.
   2. Use suitable cable fittings and connectors.

G. Special Techniques - Wiring Connections:
   1. Clean conductor surfaces before installing lugs and connectors.
   2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
   3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
   4. Install high pressure crimp connectors for copper conductor splices and taps, 6 AWG and larger.
   5. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

3.5 WIRE COLOR

A. General:
   1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
      a) Black and red for single phase circuits at 120/240 volts.
      b) Black and red for circuits at 120/208 volts single or three phase.
      c) Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
   2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
      a) Black and red for single phase circuits at 120/240 volts.
      b) Black and red for circuits at 120/208 volts single or three phase.
      c) Orange, brown, and yellow for circuits at 277/480 volts single or three phase.

B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.

C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.

D. Feeder Circuit Conductors: Uniquely color code each phase.

E. Ground Conductors:
   1. For 6 AWG and smaller: Green.
   2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

F. Control wiring:
   1. Match owners color code for 24 volt and 120 volt control wiring.

3.6 FIELD QUALITY CONTROL

A. Section 01700 – Miscellaneous Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION

SECTION 16128

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes, and handholes.

B. Related Sections:
1. Section 16060 - Grounding and Bonding for Electrical Systems.
2. Section 16070 - Hangers and Supports for Electrical Systems.
3. Section 16123 – Building Wire And Cable.

1.2 REFERENCES

A. American National Standards Institute:
1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.

B. National Electrical Manufacturers Association:
1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
4. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.
5. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
6. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
7. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.3 SYSTEM DESCRIPTION

A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

B. Outdoor Locations, Above Grade: Provide PVC coated rigid galvanized conduit. Provide cast metal or nonmetallic outlet, pull, and junction boxes.

C. Wet and Damp Locations (Lower Screen Room, Upper Screen Room, and Loading Area): Provide PVC coated rigid galvanized conduit. Provide cast metal outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.

D. Concealed Dry Locations (Control Room and Utility Room): Provide rigid galvanized steel conduit. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

E. Exposed Dry Locations (Control Room and Utility Room): Provide rigid galvanized steel conduit. Provide cast metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

1.4 DESIGN REQUIREMENTS

A. Minimum Raceway Size: 3/4 inch unless otherwise specified.

1.5 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit for the following:
   1. Wireway.
   2. Pull and junction boxes.

1.6 CLOSEOUT SUBMITTALS

A. Section 01700 - Miscellaeous Requirements: Closeout procedures.

B. Section 01330 – Submittal Procedures: Project Record Documents:
   1. Record actual routing of conduits.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

B. Protect PVC coated conduit from sunlight.

1.8 COORDINATION

A. Coordinate installation of outlet boxes for equipment.

B. Coordinate mounting heights, orientation, and locations of outlets mounted above counters, benches, and backsplashes.

PART 2 PRODUCTS

2.1 METAL CONDUIT

A. Rigid Galvanized Steel Conduit: ANSI C80.1.

B. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.

2.2 PVC COATED METAL CONDUIT

A. Product Description: NEMA RN 1; rigid galvanized steel conduit with external PVC coating, 40 mil PVC thickness.

B. Fittings and Conduit Bodies: NEMA FB 1; steel fittings with external PVC coating to match conduit.

2.3 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Product Description: Interlocked steel construction with PVC jacket.

B. Fittings: NEMA FB 1.

2.4 NONMETALLIC CONDUIT

A. Product Description: NEMA TC 2; Schedule 40 or 80 PVC.

B. Fittings and Conduit Bodies: NEMA TC 3.

2.5 PULL AND JUNCTION BOXES

A. Manufacturers:
1. Carlon Electrical Products.
2. Hubbell Wiring Devices.
3. Thomas & Betts Corp.
4. Walker Systems Inc.
5. Quazite.

B. Sheet Metal Boxes NEMA OS 1, stainless steel.

C. Hinged Enclosures.

D. Surface Mounted Cast Metal Box: NEMA 250, Type as indicated on Drawings; flat-flanged, surface mounted junction box:
1. Material: Cast aluminum.
2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify project conditions.

B. Verify locations and routings and termination locations of raceway prior to rough-in.

3.2 EXISTING WORK

A. Remove exposed abandoned raceway. Cut raceway flush with walls and floors, and patch surfaces. Remove concealed abandoned raceway to its source.

B. Disconnect abandoned outlets and remove devices. Remove abandoned outlets when raceway is abandoned and removed. Install blank cover for abandoned outlets not removed.

C. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.

D. Extend existing raceway and box installations using materials and methods compatible with existing electrical installations, or as specified.

E. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.3 INSTALLATION

A. Ground and bond raceway and boxes in accordance with Section 16060.

B. Fasten raceway and box supports to structure and finishes in accordance with Section 16070.

C. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.4 INSTALLATION - RACEWAY

A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.

B. Arrange raceway supports to prevent misalignment during wiring installation.

C. Support raceway using stainless steel or malleable iron straps to match environment, lay-in adjustable hangers, clevis hangers, and split hangers.

D. Group related raceway; support using conduit rack. Construct rack using channel as specified in Section 16070; provide space on each for 25 percent additional raceways.

E. Do not support raceway with wire or perforated pipe straps.

F. Do not attach raceway to ceiling support wires or other piping systems.

G. Construct raceway supports from channel as specified in Section 16070.

H. Route exposed raceway parallel and perpendicular to walls.

I. Route raceway installed above accessible ceilings parallel and perpendicular to walls.

J. Where wireway passes through walls and slabs, core holes and seal with non-shrink grout after installation of the conduits.

K. Where new concrete, route conduit in and under slab from point-to-point.

L. Maximum Size Conduit in Slab Above Grade: 1 inch. Do not cross conduits in slab.

M. Maintain clearance between raceway and piping for maintenance purposes.

N. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.

O. Cut conduit square using saw or pipe cutter; de-burr cut ends.

P. Bring conduit to shoulder of fittings; fasten securely.

Q. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.

R. Install conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

S. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install factory elbows for bends in metal conduit larger than 2 inch size.

T. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.

U. Install fittings to accommodate expansion and deflection where raceway crosses seismic, control and expansion joints.

V. Install suitable pull string or cord in each empty raceway and with new wire installed in existing.

W. Install suitable caps to protect installed conduit against entrance of dirt and moisture and close ends and unused openings in raceway.

X. Install NEC approved conduit sealing fittings at each wall and slab penetration between rated and unrated areas. Seal using fiber filler dams and sealing cement after testing of all systems.

3.5 INSTALLATION - BOXES

A. Install wall mounted boxes at elevations to accommodate mounting heights as indicated on Drawings or specified.

B. Adjust box location up to 10 feet prior to rough-in to accommodate intended purpose.

C. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

D. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

E. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

F. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches separation. Install with minimum 24 inches separation in acoustic rated walls.

G. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

H. Install stamped steel bridges to fasten flush mounting outlet box between studs.

I. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

J. Install adjustable steel channel fasteners for hung ceiling outlet box.

K. Do not fasten boxes to ceiling support wires or other piping systems.

L. Support boxes independently of conduit.

M. Install gang box where more than one device is mounted together. Do not use sectional box.

N. Install gang box with plaster ring for single device outlets.

3.6 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods in accordance with contract documents.

B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation.

C. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.7 ADJUSTING

A. Section 01700 - Miscellaneous Requirements: Testing, adjusting, and balancing.

B. Adjust flush-mounting outlets to make front flush with finished wall material.

C. Install knockout closures in unused openings in boxes.

3.8 CLEANING

A. Section 01700 - Miscellaneous Requirements: Final cleaning.

B. Clean interior of boxes to remove dust, debris, and other material.

C. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 16411

ENCLOSED SWITCHES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Nonfusible switches.

B. Related Requirements:
   1. Section 16070 - Hangers and Supports for Electrical Systems.

1.2 REFERENCE STANDARDS

A. National Electrical Manufacturers Association:
   1. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

B. International Electrical Testing Association:
   1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit switch ratings and enclosure dimensions.

1.4 CLOSEOUT SUBMITTALS

A. Section 01330 – Submittal Procedures: Record drawings shall indicate actual locations of enclosed switches and ratings.

B. Section 01700 - Miscellaneous Requirements: Closeout procedures.

PART 2 PRODUCTS

2.1 NONFUSIBLE SWITCH ASSEMBLIES

A. Manufacturer List:
   1. Appleton.
   2. Eaton.
   3. General Electric.
   4. Schneider Electric, Square D.

B. Description: NEMA KS 1, Type HD with externally operable handle interlocked to prevent opening front cover with switch in ON position enclosed load interrupter knife switch. Handle lockable in OFF position.

C. Operation:
   1. Switch Ratings
      a. Switch Rating: Horsepower rated for AC or DC as indicated on Drawings.
      b. Short Circuit Current Rating: UL listed 200,000 rms symmetrical amperes.

D. Materials:
   1. Enclosure: NEMA KS 1, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel for Type 1 areas, stainless steel for type 3R and 4X areas, and aluminum for Class 1 Division 2 Group D areas.
      a. Interior Dry Locations: Type 1.
      b. Exterior Locations: Type 3R.
      c. Industrial Locations: Type 4X .
      d. NEC rated areas: Type as per the NEC.
   2. Furnish switches with entirely copper current carrying parts.

PART 3 EXECUTION

3.1 DEMOLITION

A. Disconnect and remove abandoned enclosed switches.

B. Maintain access to existing enclosed switches and other installations remaining active and requiring access. Modify installation or provide access.

3.2 INSTALLATION

A. Install enclosed switches where indicated.

B. Install enclosed switches plumb. Provide supports in accordance with Section 16070.

C. Height: 5 feet to operating handle.

D. Install engraved plastic nameplates on each switch. Engrave nameplates with the equipment served and the panel and circuit number supplying the switch.

3.3 FIELD QUALITY CONTROL

A. Section 01700 - Miscellaneous Requirements: Requirements for testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.5.

3.4 CLEANING

A. Section 01700 - Miscellaneous Requirements: Requirements for cleaning.

B. Clean existing enclosed switches to remain or to be reinstalled.

END OF SECTION

SECTION 16443

MOTOR CONTROL CENTERS

PART 1 GENERAL

1.1 WORK INCLUDES

A. Electrical Contractor provide:
   1. Units to retrofit into existing motor control center.

B. Related Sections:
   1. Section 16060 - Grounding and Bonding for Electrical Systems.
   2. Section 16411 – Enclosed Switches

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers:
   1. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

B. National Electrical Manufacturers Association:
   1. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
   2. NEMA FU 1 - Low Voltage Cartridge Fuses.
   3. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
   4. NEMA ICS 2.3 - Instructions for the Handling, Installation, Operation, and Maintenance of Motor Control Centers.
   5. NEMA ICS 3 - Industrial Control and Systems: Factory Built Assemblies.
   6. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.
   7. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

C. International Electrical Testing Association:
   1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate electrical characteristics including voltage, frame size and trip ratings, withstand ratings, and time and current curves of equipment and components.

C. Wiring Diagrams: Project specific interconnecting wiring diagrams pertinent to class and type specified for motor control center. Schematic diagram of each type of controller unit indicated.

D. Product Data: Submit electrical characteristics including voltage, frame size and trip ratings, fault current withstand ratings, and time-current curves of equipment and components.

E. Test Reports: Indicate field test and inspection procedures and test results.

F. Operation and Maintenance Data: Submit replacement parts list for controllers.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store in clean, dry space. Maintain factory wrapping or provide additional canvas or plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with NEMA ICS 2.3. Handle carefully to avoid damage to motor control center components, enclosure, and finish.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Conform to NEMA ICS 2 service conditions during and after installation.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 EXISTING 480 VOLT MOTOR CONTROL CENTER

A. Manufacturer:
1. Westinghouse to match existing unit. Existing Motor Control Center G.O. #CGC-11807 IT.3-1

B. Product Description: NEMA ICS 3, Class II, Type B motor control center.

C. Feeder Tap Units: Molded case thermal-magnetic circuit breakers.

D. Voltage Rating: 480V, 3-phase.

E. Integrated Equipment Short Circuit Rating: Match Existing.

F. Configuration: Units front mounting only, accessible from front only.

G. Enclosure: NEMA ICS 6, Type 1, unless otherwise indicated to meet environmental conditions at installed location.

H. Provide one Eaton Series 2100 Five Star Vintage dual 30/30 amp feeder breaker for installation in a 12” space, catalog FSF2DD12 or identical product by other manufacturer. Plug-in 480 volt dual feeder breaker shall include operating handles, bus stabs, door, and mounting hardware.

I. Finish: Manufacturer's standard gray enamel.

2.2 MOLDED CASE CIRCUIT BREAKER

A. Product Description: NEMA AB 1, molded-case circuit breaker.

B. Field-Adjustable Trip Circuit Breaker: Circuit breakers with frame sizes 400 amperes and larger have mechanism for adjusting long time, short time, continuous current setting for automatic operation.

C. Field-Changeable Ampere Rating Circuit Breaker: Circuit breakers with frame sizes 225 amperes and larger have changeable trip units.

D. Solid-State Circuit Breaker: Electronic sensing, timing, and tripping circuits for adjustable current settings; instantaneous trip; and adjustable short time trip. Main circuit breaker if required shall have ground fault trip with integral ground fault sensing.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify surfaces are suitable for installation.

3.2 EXISTING WORK

A. Disconnect and remove abandoned units from motor control center as indicated on drawings. Fill all voids with metal materials matching surrounding finish.

B. Maintain access to existing motor control centers and other installations remaining active and requiring access.

3.3 INSTALLATION

A. Install units in motor control center in accordance with NEMA ICS 2.3.

B. Tighten accessible bus connections and mechanical fasteners after installing components.

C. Install engraved plastic nameplates to match adjacent breakers, wording per drawings.

D. Ground and bond motor control centers in accordance with Section 16060.

3.4 ADJUSTING

A. Adjust settings on adjustable circuit breakers as indicated in Coordination Study.

3.5 FIELD QUALITY CONTROL

A. Section 01700 – Miscellaneous Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.16.

END OF SECTION

Section II

Contract Forms

Proposal

Project: **Screening Equipment Replacement, Capital Project No. 1858**

Location: 3501 Kishwaukee Street, Rockford, Illinois

Completion Dates: The South Screen shall be functional within eight (8) weeks of the date of the Notice to Proceed – March 11, 2019. The North Screen shall be functional within fourteen (14) weeks of the date of the Notice to Proceed – April 22, 2019. All testing and work shall be completed by May 31, 2019.

Liquidated Damages: $1,500/calendar day for South Screen operational date deadline
$1,500/calendar day for North Screen operational date deadline
$300/calendar day for final completion date deadline

To: Board of Trustees
Rock River Water Reclamation District
3501 Kishwaukee Street
Rockford, IL 61109

From: _____
(Individual, Partnership or Corporation, as case may be)

_____

(Address of Individual, Partnership or Corporation)

Gentlemen:

I (We), the undersigned, hereby propose to furnish all materials, equipment, tools, services, labor, and whatever else may be required to construct and place in service the above subject Sanitary Sewer for the Rock River Water Reclamation District all in accordance with the plans and specifications, provided by the Rock River Water Reclamation District. The undersigned also affirms and declares:

1. That I (we), have, examined and am (are) familiar with all the related contract documents and found that they are accurate and complete and are approved by the undersigned.

2. That I (we), have carefully examined the site of the work, and that, from my (our) investigation, has satisfied myself (ourselves) as to the nature and location of the work, the character, quality, and quantity of materials and the kind and extent of equipment and other facilities needed for the performance of the work, the general and local conditions and all difficulties to be encountered, and all other items which may, in any way, effect the work or its performance.

3. That this bid is made without any understanding, agreement or connection with any other person, firm, or corporation making a bid for the same purposes, and is in all respects fair and without collusion or fraud; and that I (we) are not barred from bidding as a result of a bid-rigging or bid-rotating conviction.

4. That accompanying the Proposal is a Bidder's Bond in the amount specified in Article 1, Notice to Bidders, payable to the Board of Trustees of the Rock River Water Reclamation District, which it is agreed, shall be retained as liquidated damages by said Rock River Water Reclamation District if the undersigned fails to execute the Contract in conformity with the contract documents incorporated in the contract documents and furnish bond as specified, within ten (10) days after notification of the award of the contract to the undersigned.

5. The Bidder is of lawful age and that no other person, firm or corporation has any interest in this Proposal or in the Contract proposed to be entered into.

6. The Bidder is not in arrears to the Rock River Water Reclamation District, upon debt or contract, and is not a defaulter, as surety or otherwise, upon any obligation to the Rock River Water Reclamation District.

7. No officer or employee or person whose salary is payable in whole or in part by the District is, shall be or become interested, directly or indirectly as a contracting party, partner, stockholder, surety of otherwise, in this Proposal, or in the performance of the Contract, or in the work to which it is relates, or in any portion of the profits thereof.

8. The Bidder which I represent complies with all applicable requirements of the Americans with Disabilities Act (ADA) and the Occupational Safety and Health Act (OSHA) and that if said bidder is awarded a contract, it will complete all OSHA-required or ADA-required employee and customer training, will make available all required information, and will hold harmless and indemnify the District and the District's representatives.

In regard to participation in an approved Apprenticeship program, upon request, Contractor will be required to provide written proof of participation.

9. The undersigned, as Bidder, declares that he has adopted and promulgated written sexual harassment policies in accordance with Public Act 99-093 and will make this information available upon request.

10. The undersigned, as Bidder, declares he will comply with prevailing wages in accordance with the Illinois Department of Labor Standards. The State of Illinois requires contractors and subcontractors on public works projects (including the Rock River Water Reclamation District) to submit certified payroll records on a monthly basis, along with a statement affirming that such records are true and accurate, that the wages paid to each worker are not less than the required prevailing rate and that the contractor is aware that filing false records is a Class B Misdemeanor. The successful Bidder shall be responsible for verifying the prevailing wages each month and notifying all subcontractors of the appropriate monthly rates. Prevailing wage rates may be found on the Illinois Department of Labor website at http://www.illinois.gov/idol/Laws-Rules/CONMED/Pages/Rates.aspx .

The certified payroll records must include the name, address, telephone number, social security number, job classification, hourly wages paid in each pay period, the number of hours worked each day, and the starting and ending time of work each day, for every worker employed on the project. Any contractor who fails to submit a certified payroll or knowingly files a false certified payroll is guilty of a Class B Misdemeanor. Certified payroll reports shall be submitted on industry standard forms such as IDOT Statement of Compliance (SBE 348) or other approved equal.

11. The undersigned, as Bidder, declares he will comply with the Federal Drug Free Workplace Act.

12. The undersigned, as Bidder, declares he will comply with Public Act 83-1030 entitled "Steel Products Procurement Act".

13. The undersigned, as Bidder, declares he will comply with Public Act 96-929 (30 ILCS 570) regarding Illinois residents employment.

14. The undersigned, as Bidder, declares he will comply with non-discrimination in employment in accordance with the Illinois Fair Employment Practices Commissions Rules & Regulations.

15. The undersigned, as Bidder, declares that he currently participates in an apprenticeship or training program that is registered with the United States Department of Labor's Bureau of Apprenticeship and Training or other acceptable State of Illinois Department of Labor monitored program.

In submitting this bid, it is understood that the right is reserved by the Rock River Water Reclamation District to reject any and all bids. It is agreed that this bid may not be withdrawn for a period of sixty (60) days from the opening thereof.

The undersigned further declares that he (they) has (have) carefully examined the following items of work and that the cost of all the work to complete this project is given in this Proposal.

LUMP SUM BID AMOUNT

1. Total Amount of Lump Sum Bid, expressed in figures, for providing all materials, equipment, warranty, and labor to complete this project in conformity with all specifications in this Invitation to Bid:

   $_____

The undersigned acknowledges that they have received Addendum numbers _____, _____, _____, and realizes that all Addenda are considered part of the contract.

Date: _____

Bidder: _____ By: _____

(Print name of firm) (Authorized rep's signature)

_____ _____

(Print street address) (Print authorized rep's name)

_____ _____

(Print city, state, zip) (Print authorized rep's title)

_____ _____

(Area code and phone number) (Fax number)

Note: The Rock River Water Reclamation District, a Governmental Unit, pays neither Federal Excise Tax nor Illinois Retailers' Occupational Tax. The bidder shall exclude those taxes from their bid.

Fair Employment Practices Affidavit of Compliance

Project: Screening Equipment Replacement, Capital Project No. 1858

NOTE: THE BIDDER MUST EXECUTE THIS AFFIDAVIT AND SUBMIT IT WITH ITS SIGNED BID. THE ROCK RIVER WATER RECLAMATION DISTRICT CANNOT ACCEPT ANY BID WHICH DOES NOT CONTAIN THIS AFFIDAVIT

_____, being first duly sworn, deposes and says that:
(Name of person making affidavit)

They are: _____ of _____
(Officer's Title) (Company Name)

that said company is and "Equal Opportunity Employer" as defined by Section 2000(e) of Chapter 21, Title 42 of the United States Code annotated and Federal Executive Orders #11375 which are incorporated herein by reference;

and that said company will comply with any and all requirements of Title 44 Admin. Code 750. APPENDIX A – Equal Opportunity Clause, Rules and Regulations, Illinois Department of Human Rights, which read as follows:

"In the event of the contractor's non-compliance with the provisions of this Equal Employment Opportunity Clause, the Illinois Human Rights Act or the Rules and Regulations of the Illinois Department of Human Rights ("Department"), the contractor may be declared ineligible for future contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations, and the contract may be cancelled or voided in whole or in part, and such other sanctions or penalties may be imposed or remedies invoked as provided by statute or regulation. During the performance to this contract, the contractor agrees as follows:

1. That it will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, marital status, national origin or ancestry, citizen status, age, physical or mental handicap unrelated to ability, sexual orientation, military status or an unfavorable discharge from military service; and further that it will examine all job classifications to determine if minority persons or women are underutilized and will take appropriate affirmative action to rectify any such underutilization.
2. That, if he or she hires additional employees in order to perform this contract or any portion of this contract, he or she will determine the availability (in accordance with the Department's Rules and Regulations) of minorities and women in the areas from which he or she may reasonably recruit and he or she will hire for each job classification for which employees are hired in a way that minorities and women are not underutilized.
3. That, in all solicitations or advertisements for employees placed by him or her or on his or her behalf, he or she will state that all applicants will be afforded equal opportunity without discrimination because of race, color, religion, sex, sexual orientation, marital status, national origin or ancestry, citizenship status, age, physical or mental handicap unrelated to ability, sexual orientation, military status or an unfavorable discharge from military service.
4. That he or she will send to each labor organization or representative of workers with which he or she has or is bound by a collective bargaining or other agreement or understanding, a notice advising such labor organization or representative of the contractor's obligations under the Illinois Human Rights Act and the Department's Rules and Regulations. If any labor organization or representative fails or refuses to cooperate with the contractor in his or her efforts to comply with such Act and Rules and Regulations, the contractor will promptly so notify the Department and the contracting agency and will recruit employees from other sources when necessary to fulfill its obligations under the contract.
5. That he or she will submit reports as required by the Department's Rules and Regulations, furnish all relevant information as may from time to time be requested by the Department or the contracting agency, and in all respects comply with the Illinois Human Rights Act and the Departments Rules and Regulations.
6. That he or she will permit access to all relevant books, records, accounts and work sites by personnel of the contracting agency and the Department for purposes of investigation to ascertain compliance with the Illinois Human Rights Act and the Department's Rules and Regulations.
7. That he or she will include verbatim or by reference the provisions of this clause in every subcontract awarded under which any portion of the contract obligations are undertaken or assumed, so that the provisions will be binding upon the subcontractor. In the same manner as with other provisions of this contract, the contractor will be liable for compliance with applicable provisions of this clause by such subcontractors; and further it will promptly notify the contracting agency and the Department in the event any subcontractor fails or refuses to comply with the provisions. In addition, the contractor will not utilize any subcontractor declared by the Illinois Human Rights Commission to be ineligible for contacts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations.

(Source: Amended at 32 I11. Reg. 16484, effective September 23, 2008)"

IL Dept of Human Rights Registration No.: _____ Expiration Date: _____

_____
Signature

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

_____
Notary Public

Bid Bond

KNOW ALL MEN BY THESE PRESENTS, that we:

_____ (hereinafter called the Principal) and

_____ (hereinafter called the Surety)

a Corporation chartered and existing under the laws of the State of _____ with its principal offices in the City of _____ and authorized to do business in the State of Illinois are held and firmly bound onto the Rock River Water Reclamation District of Winnebago County, Illinois (District), in the full and just sum of: **FIVE PERCENT (5 %) OF THE TOTAL BID PRICE** good lawful money of the United States of America, to be paid upon demand of the District, to which payment will and truly to be made we bind ourselves, our heirs, executors, administrators, and assigns, jointly and severally and firmly by these presents.

WHEREAS, the Principal is about to submit, or has submitted to the District, a proposal for constructing Sanitary Sewers and Appurtenances.

WHEREAS, the Principal desires to file this bond, in accordance with law, to accompany this Proposal.

NOW THEREFORE, The conditions of this obligation are such that if the Proposal be accepted, the Principal shall, within ten days after the date of receipt of a written notice of award of Contract, execute a Contract in accordance with the Proposal and upon the terms, conditions, and prices set forth therein, in the form and manner required by the District, and execute a sufficient and satisfactory Contract Performance Bond payable to said District in an amount of one hundred percent (100%) of the Contract price (including alternates) in form and with security satisfactory to said District, then this obligation to be void, otherwise to be and remain in full force and virtue in law; and the Surety shall, upon failure of the Principal to comply with any or all of the foregoing requirements within the time specified above, immediately pay to the aforesaid District, upon demand, the amount hereof in good and lawful money of the United States of America, not as a penalty, but as liquidated damages.

IN TESTIMONY THEREOF, the Principal and Surety have caused these presents to be duly signed and sealed this ___ day of _____, 20___.

_____

Principal

(Seal) By _____

Name:_____

Title:_____

Date:_____

ATTEST:

_____
Secretary

_____

Surety

(Seal)

By_____

Name:_____

Title:_____

Date:_____

Agreement

1. General

THIS AGREEMENT, made and concluded this _____ day of _____ _____ 2018, between the Rock River Water Reclamation District, Rockford, Illinois (District), acting by and through the Board of Trustees, and _____, his/their executors, administrators, successors or assigns:

2. Scope of Work

WITNESSETH: That for and in consideration of the payments and agreements made in the Proposal attached hereto, to be made and performed by the District and according to the terms expressed in the Bond referring to these presents, the Contractor agrees with the District at his/their own proper cost and expense to do all the work, furnish all equipment, materials and all labor necessary to complete the work in accordance with the plans and specifications hereinafter described, and in full compliance with all of the terms of this agreement and the requirements of the District and its representative.

And it is also understood and agreed that the Bidding Requirements, Detailed Specifications, Contract Forms, General Conditions, General Requirements, Technical Specifications, Plans, Addenda, and provisions required by law are all essential documents of the contract, and are a part hereof, as if herein set out verbatim or as if attached, except for titles, subtitles, headings, table of contents and portions specifically excluded.

3. Contract Price

The District shall pay to the Contractor, and the Contractor shall accept, in full payment for the performance of this Contract, subject to any additions or deductions provided for hereby, in current funds, the Total Contract Price of _____ and 00/100 ($_____).

Payments are to be made to the Contractor in accordance with and subject to the provisions of Section 7 of this Agreement, which is a part of this Contract.

4. Bond

The Contractor has entered into and herewith tenders a bond of even date herewith, in the penal sum of _____ and 00/100 ($_____) to insure the faithful performance of this Contract, which said bond is hereby made a part of this Contract by reference.

5. Maintenance and Guarantee

The Contractor shall promptly repair, replace, restore or rebuild any imperfections that may arise and shall maintain satisfactory to the District all work for a period three years from the date of final acceptance of the Contract for trench settlement and for a period of two years all other work, except where periods of maintenance and guarantee are provided for. The Contractor shall, for this period, indemnify and save harmless the District, its officers and agents from any injury done to property or persons as a direct or alleged result of imperfections in the Contractors' work, and shall immediately assume and take charge of the defense of such action or suits in like manner and to all intents and purposes as if said actions and suits had been brought directly against the Contractor.

If the Contractor shall fail to repair, replace, rebuild or restore such defective or damaged work promptly after receiving notice given by the District, the District shall have the right to have the work done by others and to call on the Contractor and his bondsman to pay the costs thereof.

6. Contract Execution

IT IS EXPRESSLY UNDERSTOOD AND AGREED that the entire improvement shall be done in a thorough and workmanlike manner, under the direction and to the satisfaction of the District and in full compliance with all the requirements of its representative under them. All loss or damage arising out of the nature of the work to be done, or from any detention of unforeseen obstruction or difficulty which may be encountered in the prosecution of the work, or from the action of the elements, shall be sustained by the Contractor.

The Contractor will be held responsible for all accidents, and hereby agrees to indemnify and protect the District from all suits, claims, and actions brought against it, and all cost, and damages which the District may be put to by reason of an injury or alleged injury, to the person or property of another in the execution of this contract, or the performance of the work, or in guarding the same, or for any material used in its prosecution or in its construction.

Any person employed on the work who shall refuse or neglect to obey the directions of the District or its representative, or who shall be deemed by the District to be incompetent, or who shall be guilty of any disorderly conduct, or who shall commit any trespass on any public or private property in the vicinity of the work, shall at once be removed from the work by the Contractor when so requested by the District.

Any request to extend the contract completion date must be considered by the Board at the Board meeting prior to the then-existing contract termination date. Any deviation from this action will result in the liquidated damage clause in the contract to be exercised.

7. Payments to Contractor

The District hereby covenants and agrees, in consideration of the covenants and agreements in this Contract, specified to be kept and performed by the Contractor and subject to the conditions herein contained, and if the District receives an acceptable invoice prior to the tenth day of the month and receives approval of the work by the District Engineering Manager, the District shall issue payment before the fifth day of the succeeding month. If the District receives an acceptable invoice on or after the tenth day of the month, the District shall issue payment before the fifth day of the second succeeding month.

The District reserves the right at all times to refuse to issue payment in case the Contractor has neglected or failed to pay any subcontractors, workmen or employee on the work.

8. Subcontracts

No part of the work herein provided for shall be sublet or subcontracted without the express consent of the District, to be entered in the records, and in no case shall consent relieve the Contractor from the obligation herein entered into, or change the terms of this Agreement.

9. Contractor's Responsibility

This Contract shall extend to and be binding upon the successors and assigns, and upon the heirs, administrators, executors, and legal representatives of the Contractor.

In consideration of and to induce the award of this Contract to him, the Contractor represents and warrants: that he is not in arrears to the District upon debt of the Contract and that he is not a defaulter, as surety, contractor or otherwise; that he is financially solvent and sufficiently experienced and competent to perform the work; that the work can be performed as called for by the Contract; that the facts stated in his proposal and the information given by him is true and correct in all respects, and that he is fully informed regarding all the conditions affecting the work to be done and labor and materials to be furnished for the completion of this Contract and that his information was secured by personal investigation and research.

The Contractor shall pay not less than the prevailing wage rate as determined by the Department of Labor, to all laborers, workmen and mechanics performing work under this Contract. Contractor shall comply with current revisions of the wage standards; as required by law. The Contractor shall be responsible for verifying the prevailing wages each month and notifying all subcontractors of the appropriate monthly rates. Certified payroll reports shall be submitted on industry standard forms such as IDOT Statement of Compliance (Form SBE 348).

In regard to nondiscrimination in employment, Contractor will be required to comply with the Illinois Fair Employment Practices Commission's Rules and Regulations as provided herein.

The Contractor shall comply with the American Disabilities Act of 1990 (ADA). The Contractor will hold harmless and indemnify the District and their representatives from all:

(a) suits, claims, or actions;
(b) costs, either for defense (including but not limited to reasonable attorney's fees and expert witness fees) or for settlement, and;
(c) damages of any kind (including but not limited to actual, punitive, and compensatory damages)

relating in any way to or arising out of the ADA, to which said firm is exposed or which it incurs in the execution of the contract.

Contractor shall also comply with Public Act 99-0933, which requires any party to a contract to adopt and enforce a written policy regarding sexual harassment that includes, as a minimum, the following information:

(a) the illegality of sexual harassment
(b) the definition of sexual harassment under Illinois State law;
(c) a description of sexual harassment, utilizing examples;
(d) my (our) organization's internal complaint process including penalties;
(e) through the Illinois Department of Human Rights and the Illinois Human Rights Commission;
(f) directions on how to contact the Department and the Commission; and
(g) protection against retaliation as provided by Section 6-101 of the Illinois Human Rights Act.

Upon request this information will be provided to the Illinois Department of Human Rights. Upon District award of a contract, the District will be provided this information described no more than ten working days after the District issues its award notification.

The Contractor shall comply with Article 2 of Public Act 83-1472 which provides that Illinois residents be employed on Illinois public works projects, provided there has been a period of excessive unemployment (5%) in the State of Illinois as defined in the Act; and further, that Illinois workers are available and capable of performing the particular type work involved.

The Contractor shall comply with all rules and regulations of OSHA during the execution of this Contract.

The Contractor shall comply with the Federal Drug Free Workplace Act.

The Steel Products Procurement Act, Illinois Public Act 83-1030, requires that steel products used or supplied in performance of this Contract or subcontract shall be manufactured or produced in the United States with three exceptions, as explained in the Instructions to Bidders.

The Contractor shall comply with Public Act 96-1416 regarding the disposal of CCDD and uncontaminated soil at CCDD fill sites as explained in the Instructions to Bidders.

10. Time

Work under this Agreement shall be commenced upon written Notice to Proceed. The South Screen shall be functional within eight (8) weeks of the date of the Notice to Proceed – March 11, 2019. The North Screen shall be functional within fourteen (14) weeks of the date of the Notice to Proceed – April 22, 2019. All testing and work shall be completed by May 31, 2019.

11. Liquidated Damages

The amount of liquidated damages shall be $1,500 per calendar day beyond the South Screen operational deadline date, $1,500 per calendar day beyond the North Screen operational deadline date, and $300.00 per calendar day beyond the final completion deadline.

12. Seals

IN WITNESS WHEREOF, the parties have hereunto set their hands and seals, and such of them as are corporations have caused these presents to be signed by their duly authorized officers.

Rock River Water Reclamation District
Winnebago County, Illinois

(Seal)

By _____
President, Board of Trustees

ATTEST: _____
Clerk of the Board

Contractor

By _____
Contractor's Officer

(Corporate Seal)

Name: _____

Title: _____

Date: _____

ATTEST: _____

Labor & Material Payment Bond

TO: _____Contractor Name

_____Contractor City, State

KNOW ALL MEN BY THESE PRESENTS

That _____(Contractor)

as Principal, and _____

a corporation of the State of _____ as Surety, are held and firmly bound unto the Rock River Water Reclamation District, as Obligee, for the use and benefit of claimants as hereinafter defined in the amount of

_____Dollars ($_____), for the payment where of Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal has by written agreement dated _____20___ Entered into a Contract with Obligee for _____ in accordance with contract documents prepared by the Rock River Water Reclamation District which Contract is by reference made a part hereof, and is hereinafter referred to as "the Contract".

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if Principal shall promptly pay for all laborers, workers and mechanics engaged in the work under the Contract, and not less than the general prevailing rate of hourly wages of a similar character in the locality in which the work is performed, as determined by the State of Illinois Department of Labor pursuant to the Illinois Compiled Statutes 280 ILCS 130 / 1-12 et.seq. and for all material used or reasonably required for use in the performance of the Contract, then this obligation shall be void; otherwise it shall remain in full force and effect.

1. A claimant is deemed as any person, firm, or corporation having contracts with the Principal or with any of Principal's subcontractors for labor or materials furnished in the performance of the Contract on account of which this Bond is given.
2. Nothing in this Bond contained shall be taken to make the Obligee liable to any subcontractor, material man or laborer, or to any other person to any greater extent than it would have been liable prior to the enactment of The Public Construction Bond Act, approved June 20, 1931, as amended; provided further, that any person having a claim for labor and materials furnished in the performance of the Contract shall have no right of action unless he shall have filed a verified notice of such claim with the Obligee within 180 days after the date of the last item of work or the furnishing of the last item of materials, which claim shall have been verified and shall contain the name and address of the claimant, the business address of the claimant within the State of Illinois, if any, or if the claimant be a foreign corporation having no place of business within the State the principal place of

business of the corporation, and in all cases of partnership the names and residences of each of the partners, the name of the Contractor for the Obligee, the name of the person, firm or corporation by whom the claimant was employed or to whom such claimant furnished materials, the amount of the claim and a brief description of the public improvement for the construction or installation of which the contract is to be performed. No defect in the notice herein provided for shall deprive the claimant of its right of action under the terms and provisions of this Bond unless it shall affirmatively appear that such defect has prejudiced the rights of an interested party asserting the same.

3. No action shall be brought on this Bond until the expiration of 120 days after the date of the last item of work or of the furnishing of the last item of material except in cases where the final settlement between Obligee and the Contractor shall have been made prior to the expiration of the 120 day period, in which case action may be taken immediately following such final settlement; nor shall any action of any kind be brought later than 6 months after the acceptance by the Obligee of the work. Such suit shall be brought only in the circuit court of this State in the judicial district in which the Contract is to be performed.
4. Surety hereby waives notice of any changes in the Contract, including extensions of time for the performance thereof.
5. The amount of this Bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder.
6. The Principal and Surety shall be liable for any attorneys fees, engineering costs, or court costs incurred by the Obligee relative to claims made against this Bond.

Signed and Sealed this _____day of _____, 2018.

CONTRACTOR **SURETY**
Contractor Firm Name

By: _____ By:_____
Signature Attorney-in-Fact

_____
Title Resident Agent

ATTEST:

_____
Corporate Secretary (Corporations only)

Performance Bond

KNOW ALL MEN BY THESE PRESENTS, that WHEREAS, the Rock River Water Reclamation District has awarded to: _____ hereinafter designated as the "Principal", a contract, dated, _____, for the Rock River Water Reclamation District.

WHEREAS, said Principal is required under the terms of said Contract to furnish a bond for the faithful performance of said Contract (the "Bond");

NOW, THEREFORE, we the Principal and _____, as Surety, are firmly bound unto the Rock River Water Reclamation District in the penal sum of _____ Dollars ($_____) lawful money of the United States for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally firmly by these presents for a performance bond. The conditions of this obligation is such that if the said Principal does well and faithfully performs all the conditions and covenants of said Contract, according to the true intent and meaning thereof, upon its part to be kept and performed, then the above obligation is to be null and void, otherwise to remain in full force and effect.

THE CONDITION OF THIS OBLIGATION IS SUCH, that if the above bounden Principal, its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and agreements in the said Contract, including the provisions for liquidated damages in the said Contract, any changes, additions or alterations thereof made as therein provided, on its part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless the Rock River Water Reclamation District, its officers and agents, as therein stipulated, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect. And 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 thereunder or the specifications accompanying the same and no inadvertent overpayment of progress payments shall in any way affect its obligations 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 or of any inadvertent overpayment of progress payments. The Rock River Water Reclamation District shall be named as beneficiary on this Performance Bond.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their seal this _____day of _____, 20_____, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

CONTRACTOR
Contractor Firm Name:

By: _____

_____
Title

ATTEST:

_____
Corporate Secretary (Corporations only)

SURETY

By: _____ Signature
Attorney-in-Fact

_____
Resident Agent

Section III

Existing Screen Data Sheet

Existing Screen Data Sheet

Parkson Corporation

Job Name / Location:	Rock River Water Reclamation District, Rockford, IL
Originator: CR	Date: 12/13/2000
Checked by:	Date:
Project Number: 200132	Revision:
Revised By:	Date:

Aqua Guard Mechanical Screen

Aqua Guard Model	AG-S (RH) AG-S (LH)
Aqua Guard Angle	85
Aqua Guard Width	5'-4½"
A.G. Discharge Height	34'-6"
Channel Width	5'-6"
Channel Depth	12'-3"
No. of Aqua Guards	2
Filtration Opening	6 mm
Total Unit Weight	37,000 lbs
A.G. Frame	5/8" Thick, A-36 CS
Drive Shaft and Sprocket	304 SS
Filter Shafts	1 3/8 Diameter, 304 SS
Rails	1" Thick, 304 SS
Screening Elements	High impact plastic
Side Plates	304 SS
Side Seals	Neoprene w/304 SS backing plate
Front Seal	Nylon bristles w/304 SS support
Brush	Nylon bristles w/304 SS shaft
Chain Links	304 SS
Chain Rollers, Bushings & Pins	410SS Series heat treated
Take Up Nuts	Titanium
Take Up Screw	304 SS
Hardware Material	304 SS
Covers	304 SS
Discharge Chute	304 SS

Section IV

General Provisions & Technical Specifications for Sanitary Sewer Construction

(Separate document incorporated by reference)