R-257-2018
Contract # 107-2018

CONTRACT DOCUMENTS

PROJECT MANUAL
WEST HICKMAN WWTP SCUM REMOVAL
ASH TANK, NO.3 COVER PROJECT
CONTRACT 22-2018
LEXINGTON-FAYETTE URBAN COUNTY
GOVERNMENT, KY
MARCH 2018
HERRICK COMPANY, INC.
OWNER's COPY

West Hickman Wastewater Treatment Plant Scum Removal Addition and Aerated Sludge Holding Tank No.3 Cover Project

Bid No. 22-2018

Project Manual

Lexington-Fayette Urban

County Government, KY

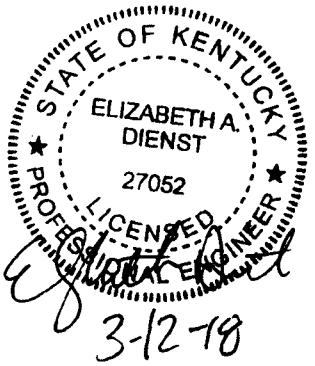
Issued for Bid

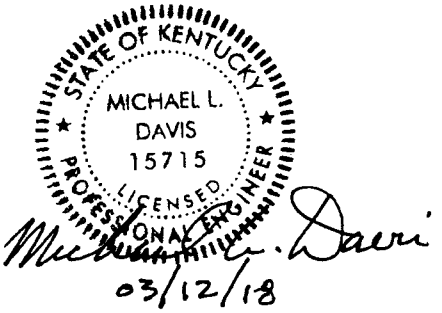
March 15, 2018

PLAN HOLDER: _____ Set No.: _____

PROJECT MANUAL

WEST HICKMAN WASTEWATER TREATMENT PLANT SCUM REMOVAL ADDITION AND AERATED SLUDGE HOLDING TANK NO. 3 COVER PROJECT
BID NO. 22-2018
LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT,
KENTUCKY





Prepared by:

STRAND ASSOCIATES, INC.®
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Issued for Bid
March 15, 2018

STRAND ASSOCIATES®

SECTION 00 01 10

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PART 1

ADVERTISEMENT FOR BIDS

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ADVERTISEMENT FOR BIDS

1. INVITATION

Sealed proposals for the following work will be received by the Lexington-Fayette Urban County Government (LFUCG) until 2:00 p.m., local time **April 5, 2018**, for furnishing all labor and/or materials and performing all work as set forth by this advertisement, conditions (general and special), specifications, and/or the drawings prepared by and for Lexington-Fayette Urban County Government, Division of Water Quality. Immediately following the scheduled closing time for reception of bids, all proposals which have been submitted in accordance with the above will be publicly opened and read aloud.

2. DESCRIPTION OF WORK

This project includes the following:

a. Construct scum concentrator.
b. Install scum pipes in existing biological phosphorus removal tanks.
c. Install cover on existing aerated sludge holding tank.
d. Construct enclosure for existing odor control facilities.
e. Structural improvements.
f. HVAC and plumbing improvements.
g. Electrical and SCADA improvements.
h. Install water line for fire protection.

3. OBTAINING PLANS, SPECIFICATIONS, AND BID DOCUMENTS

Plans, Specifications, and Contract Documents may be obtained from Lynn Imaging, 328 Old Vine Street, Lexington, Kentucky 40507, (859) 255-1021 for a non-refundable fee for each full set of plans and documents.

Specifications, Plans, and Bid Documents may be examined at the following places:

Lexington-Fayette Urban County Government
Division of Central Purchasing
200 East Main Street, Third Floor, Room 338
Lexington, Kentucky 40507
(859) 258-3320

4. METHOD OF RECEIVING BIDS

Bids will be received from Prime Contracting firms on a **Lump Sum with Bid Alternatives Basis** as shown in the Form of Proposal total Project. The Bidder must include a price for all bid items to be considered. Bids shall be submitted in the manner and subject to the conditions as set forth and described in the Instruction to Bidders and Special Conditions.

Sealed bids shall be clearly marked on the outside of the container as follows: Company Name and Address, Bid Invitation Number, and the Project Name. Bids are to remain sealed until official Bid closure time.

Mailed bids/proposals should be sent to the Director, Division of Central Purchasing, 200 East Main Street, Lexington, KY 40507.

5. METHOD OF AWARD

The Contract, if awarded, will be to the lowest, qualified responsible bidder for the total project whose qualifications indicate the award will be in the best interest of the OWNER and whose bid/proposal complies with all the prescribed requirements. No Notice of Award will be given until the OWNER has concluded such investigation as deemed necessary to establish the responsibility, qualifications and financial ability of Bidders to do the work in accordance with the Contract Documents to the satisfaction of the OWNER within the time prescribed. The OWNER reserves the right to reject the Bid of any Bidder who does not pass such investigation to the OWNER's satisfaction. In analyzing Bids, the OWNER may take into consideration alternate and unit prices, if requested by the Bid forms.

6. BID WITHDRAWAL

No bidder may withdraw his bid for a period of sixty (60) calendar days after the closing date for receipt of bids. Errors and omissions will not be cause for withdrawal of bid without forfeit of bid bond. Bids may be withdrawn in person prior to the closing date of receipt of bids.

7. BID SECURITY

All bids shall be accompanied by a bid bond of not less than five percent (5%) of the amount of the bid executed by a Surety Company authorized to do business in the Commonwealth of Kentucky and countersigned by a licensed Kentucky Resident Agent, representing the Surety Company. Check or bond shall be payable to Lexington-Fayette Urban County Government.

8. SUBMISSION OF BIDS

CONTRACTORS shall submit their bids to the Lexington-Fayette Urban County Government, Division of Purchasing, Third Floor, 200 East Main Street, Lexington, Kentucky 40507. **Bids shall be submitted in a sealed envelope not later than 2:00 p.m.**

local time, April 5, 2018. Sealed proposals shall be clearly marked on the outside of the container as follows: Company Name and Address, Bid Invitation Number, and Project Name to be opened at 2:00 p.m. local time **April 5, 2018**. Bids are to remain sealed until official Bid closure time. Bids received after the scheduled closing time for receipt of bids will not be considered and will be returned unopened.

9. RIGHT TO REJECT

The Lexington-Fayette Urban County Government reserves the right to reject any and all bids and to waive all informalities and/or technicalities where the best interest of the Lexington-Fayette Urban County Government may be served.

10. NOTIFICATION TO THE LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT FOR AFFIRMATIVE ACTION PLAN AND CURRENT WORKFORCE

The successful bidder must submit, within seven (7) calendar days of the bid opening, the following items to the Lexington-Fayette Urban County Government:

1. Affirmative Action Plan for his/her firm.
2. Current Workforce Analysis Form.

Failure to submit these items as required herein may result in disqualification of the Bidder from the award of the contract.

All submissions should be directed to:

Lexington-Fayette Urban County Government
Division of Purchasing
200 East Main Street, 3rd Floor, Room 338
Lexington, Kentucky 40507

11. NOTICE CONCERNING DBE GOAL

Notice of requirement for Affirmative Action to ensure Equal Employment Opportunities and Disadvantaged Business Enterprises (DBE) contract participation.

The Lexington-Fayette Urban County Government has set a goal that not less than ten percent (10%) of the total value of this contract be subcontracted to Disadvantaged Business Enterprises. The goal for the utilization of Disadvantaged Business Enterprises as subcontractors is a recommended goal. Contractors who fail to meet such goals will be expected to provide written explanations to the EEO Office and the Director of the Division of Purchasing of efforts they have made to accomplish the recommended goals, and the extent to which they are successful in accomplishing the recommended goals will be a consideration in the procurement process.

For assistance in locating Disadvantaged Business Enterprises Subcontractors contact:

Sherita Miller, Division of Central Purchasing
Lexington-Fayette Urban County Government
200 East Main Street, 3rd Floor, Room 338
Lexington, Kentucky 40507
(859) 258-3323

12. PREBID MEETING

There is a prebid meeting scheduled for this project for **March 22, 2018, 10 A.M. at WEST HICKMAN WASTEWATER TREATMENT PLANT, 645 W. HICKMAN PLANT ROAD, NICHOLASVILLE, KY 40356.** Attendance at prebid meeting is not mandatory.

13. CONSENT DECREE REQUIREMENTS

The work to be provided through this bid will assist the **LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT** (the **"OWNER")** in successfully implementing the **PROJECT** and complying with any requirements which are related to the Consent Decree entered in a case styled *United States & Commonwealth of Kentucky* v. *Lexington Fayette Urban County Government,* United States District Court for the Eastern District of Kentucky, Civil Action No. 5:06-cv-386-KSF (the "**CONSENT DECREE**"). The services provided through this bid are hereinafter referred to as the **PROJECT. The primary goal of the PROJECT is to provide the OWNER with the technical support and/or construction services necessary to successfully meet the obligations and deadlines of the CONSENT DECREE.**

The **BIDDER** shall familiarize itself with and shall at all times comply with the **CONSENT DECREE**, and all federal, state and local laws, ordinances, and regulations that in any manner affect the **PROJECT**. Time is of the essence in the performance of this **PROJECT**. **BIDDER** is aware that the **OWNER** is subject to penalties for non-compliance with the **CONSENT DECREE** deadlines.

If delays result solely by reason of acts of the BIDDER, the BIDDER shall be held liable for any financial penalties incurred by the **OWNER** as a result of the delay, **including but not limited to those assessed pursuant to the CONSENT DECREE.** In the event the parties cannot mutually agree upon the cause(s) associated with delays in completing project deliverables. The **BIDDER** must immediately notify the **OWNER** in the event of such delay, and provide the **OWNER** a written action plan within five (5) business days on how it will attempt to resolve the delay.

In the event that **Bidder's** delay or other nonperformance of its obligations hereunder results in the imposition of penalties against the **OWNER** pursuant to the **CONSENT DECREE**, or the **OWNER** otherwise suffers damage as a result of such delay or nonperformance, **BIDDER** shall be solely liable to **OWNER** for any and all such damages, including any costs and attorney's fees.

END OF SECTION

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INFORMATION FOR BIDDERS

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PART II

INFORMATION FOR BIDDERS

1. RECEIPT AND OPENING OF BIDS

The Lexington-Fayette Urban County Government (herein called the OWNER) invites bids from firms on the project described in the Advertisement for Bids. The OWNER will receive bids at the Division of Purchasing, at the time and in the manner set forth in the Advertisement for Bids, and the Bids will then be publicly opened and read aloud. The OWNER may consider informal any bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities or reject any and all bids. Any bid may be withdrawn prior to the scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered. No bidder may withdraw a bid within 60 days after the actual time and date of the bid opening, but OWNER may, in its sole discretion, release any bid and return the Bid Security prior to that date.

The Lexington-Fayette Urban County Government assumes no responsibility for bids that are not addressed and delivered as indicated above. Bids that are not delivered to the Division of Central Purchasing by the stated time and date will be rejected.

2. PREPARATION OF BID

Each bid must be submitted on the prescribed Form of Proposal. All blank spaces for the bid prices must be filled in, either in ink or typewritten, for both unit prices and extensions. Totals for each bid item must be added to show the total amount of the bid. Each bid must be submitted in a sealed envelope bearing on the outside the name of the bidder, their address, the name of the project, the invitation number and time and date for which the bid is submitted. Bids must be addressed to the Director of Purchasing, Lexington-Fayette Urban County Government, Third Floor, 200 East Main Street, Lexington, Kentucky 40507. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed as specified above.

3. SUBCONTRACTS

The bidder is specifically advised that any person, firm, or other party to whom it is proposed to award a subcontract under this Contract must be acceptable to the OWNER. All proposed subcontractors must be identified on the Form of Proposal. Prior to the award of Contract, the OWNER or the OWNER'S representative will advise the CONTRACTOR of the acceptance and approval thereof or of any action necessary to be taken. Should any Subcontractor be rejected by the OWNER, the CONTRACTOR shall present a new name and/or firm to the OWNER at no change in the Contract Price.

4. QUALIFICATION OF BIDDER

The OWNER may make such investigations as the OWNER deems necessary to determine the ability of the bidder to perform the Work, and the bidder shall furnish to the OWNER all such information and data for this purpose as the OWNER may request. The OWNER reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the OWNER that such bidder is properly qualified to carry out the obligations of the Contract and to complete the Work contemplated therein. Conditional bids will not be accepted.

In evaluating Bids, OWNER shall consider the qualifications of the BIDDERS, whether or not the Bids comply with the prescribed requirements, and alternatives and unit prices, as requested. OWNER may consider maintenance requirements, performance data, and disruption or damage to private property. It is OWNER'S intent to accept alternatives, if requested by the bid forms, in the order in which they are listed in the Bid Form but OWNER may accept or decline them in any order or combination. The contract, if awarded, will be awarded to the lowest, qualified, responsible BIDDER based upon OWNER'S evaluation which indicates that the award will be in the best interest of OWNER and the general public.

In the event there is any question as to the bidder's qualifications and ability to complete the work, a final determination will be made in accordance with a fair evaluation by the Urban County Government of the above listed elements.

A. If the OWNER requires filling out a detailed financial statement, the bidder may provide its current certified financial statement(s) for the required time interval.

B. Corporate firms are required to be registered and in good standing with the requirements and provisions of the Office of the Secretary of State, Commonwealth of Kentucky.

C. Good standing with Public Works Act - any CONTRACTOR and/or subcontractors in violation of any wage or work act provisions (KRS 337.510 to KRS 337.550) are prohibited by Statutory Act (KRS 337.990) from bidding on or working on any and all public works contracts, either in their name or in the name of any other company, firm or other entity in which he might be interested. No bid from a prime contractor in violation of the Act can be considered, nor will any subcontractor in violation of the Act be approved and/or accepted. The responsibility for the qualifications of the subcontractor is solely that of the prime contractor.

D. Documents Required of CONTRACTOR - (1) A sworn statement signed by the President or owner of the Company regarding all current work in progress anywhere; (2) A document showing the percent of completion of each project and the total worth of each project; and (3) Documentation showing the percentage of the DBE employment levels on each project of the Bidder's current work force, and DBE participation levels for Subcontractors.

E. Optional OWNER Requirements–The OWNER, at its discretion, may require the BIDDER/CONTRACTOR to provide: (1) A current detailed financial statement for a period including up to 3 prior years. (2) Financial security or insurance in amounts and kinds acceptable to the OWNER to meet the financial responsibility requirements for the CONTRACTOR to indemnify the OWNER. (3) Additional information and/or DBE work force data, as well as DBE participation data.

Each bidder agrees to waive any claim it has or may have against the Owner, the Architect/Engineer, and their respective employees, arising out of or in connection with the administration, evaluation, or recommendation of any bid.

5. BID SECURITY

A. Each bid must be accompanied by a bid bond prepared on a Form of Bid Bond and attached hereto, duly executed by the bidder as principal and having as surety thereon a surety company approved by the OWNER, in the amount of 5% of the bid. Such bid bond will be returned to the unsuccessful bidder(s) only upon written request to the Director of Central Purchasing within seven (7) days of opening of bids. Bid bond shall be made payable to the Lexington-Fayette Urban County Government. Bid security is not required for projects under $50,000.

B. Bonds shall be placed with an agent licensed in Kentucky with surety authorized to do business within the state. When the premium is paid for such coverage, the full commission payable shall be paid to such local agent who shall not divide such commission with any person other than a duly licensed resident local agent.

6. LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT

The successful bidder, upon his failure or refusal to execute and deliver the Contract and bonds required within ten (10) days after he has received notice of the acceptance of his bid, shall forfeit to the OWNER, as liquidated damages for such failure or refusal, the security deposited with his bid.

7. TIME OF COMPLETION AND LIQUIDATED DAMAGES

Bidder must agree to commence work on or before a date to be specified in a written "Notice to Proceed" from the OWNER and to fully complete the Project within the time as specified in the Contract. Bidder must agree also to pay $1,500.00 per day as liquidated damages, or the sum as specified in the Contract for each consecutive calendar day thereafter as hereinafter provided in the General Conditions.

8. EXAMINATION OF CONTRACT DOCUMENTS AND SITE

A. It is the responsibility of each Bidder before submitting a Bid, to (a) examine the Contract Documents thoroughly, (b) visit the site(s) to become familiar with local conditions that may affect cost, progress, performance or furnishing of the work, (c) consider Federal, State and Local laws and regulations that may affect cost, progress, performance or furnishing of the work, (d) study and carefully correlate Bidder's observations with the Contract Documents, and (e) notify Engineer of all conflicts, errors or discrepancies in the Contract Documents.

B. Bidders should examine the requirements of Section 4 of the General Conditions for information pertaining to subsurface conditions, underground structures, underground facilities, and availability of lands, easements, and rights-of-way. The completeness of data, presented in the Contract Documents, pertaining to subsurface conditions, underground structures, and underground facilities for the purposes of bidding or construction is not assured. The Bidder will, at Bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests and studies and obtain any additional information and data which pertain to the physical conditions (surface and subsurface) which may affect cost, progress, performance or furnishing of the Work and which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of the Contract Documents. On request in advance, OWNER will provide access to the site to conduct such explorations and tests as each Bidder deems necessary for submission of a bid. Bidder shall fill all holes, clean up and restore the site to its former condition upon completion of such explorations.

C. The submission of a Bid will constitute an incontrovertible representation by the Bidder that Bidder has complied with every requirement of this paragraph 8; that without exception the Bid is premised upon furnishing and performing the Work required by the Contract Documents and such means, methods, techniques, sequences or procedures of construction as may be indicated in or required by the Contract Documents; and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

9. ADDENDA AND INTERPRETATIONS

No interpretation of the meaning of the Contract Documents will be made to any bidder orally. Every request for such interpretation should be in writing addressed to the Director of Central Purchasing, who in turn will have an addendum issued under signature of the Engineer for the Lexington-Fayette Urban County Government, and to be given consideration must be received 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 to the specifications which, if issued, will be mailed by certified mail with return receipt requested or faxed to all prospective bidders. Failure of any bidder to receive any such addendum or

interpretation shall not relieve such bidder from any obligation under his bid as submitted. All addenda so issued shall become part of the Contract Documents.

10. SECURITY FOR FAITHFUL PERFORMANCE

A. Simultaneously with his delivery of the executed Contracts, the CONTRACTOR shall furnish a surety bond or bonds as security for the faithful performance of this Contract and for payment of all persons performing labor on the Project under this Contract and furnishing materials in connection with this Contract, as specified in the General Conditions. The surety on such bond or bonds shall be a duly authorized surety company satisfactory to the OWNER and authorized to do business in the Commonwealth of Kentucky.

B. All bonds required by this Contract and laws of this State shall be placed with agents licensed in the State of Kentucky. When the premium is paid for such coverage's, the full commission shall be paid to such local agent who shall not divide such commission with any person other than a duly licensed resident local agent.

C. **Contractor shall use standard Performance and Payment Bond forms such as documents provided with this contract book or AIA form A312-1984 (or later). Each document shall be for 100% of the Contract Bid Amount.**

11. POWER OF ATTORNEY

Attorney-in-fact who signs bid bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

12. TAXES AND WORKMEN'S COMPENSATION

The CONTRACTOR and subcontractor will be required to accept liability for payment of all payroll taxes, sales and use tax, and all other taxes or deductions required by local, state or federal law, such as old age pension, social security, or annuities measured by wages. Each shall carry Workmen's Compensation Insurance to the full amounts as required by Statutes and shall include the cost of all foregoing items in the proposal. The CONTRACTOR will not otherwise be reimbursed or compensated for such tax payments. The CONTRACTOR is urged to ascertain at his own risk his actual tax liability in connection with the execution or performance of his Contract.

13. LAWS AND REGULATIONS

The bidder's attention is directed to the fact that all applicable state laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Contract throughout, and they will be deemed to be included in the contract, the same as though herein written out in full.

14. EROSION AND SEDIMENT CONTROL AND PERMITS

The CONTRACTOR and Subcontractors performing work on projects on behalf of the OWNER shall also comply with all applicable federal, state, and local environmental regulations and all requirements and conditions set forth in "special" permits including but not limited to Corp of Engineers 404 permits, 401 Water Quality Certifications, Stream Crossing and Floodplain Encroachment Permits as described in Part 4 General Conditions Paragraph 5.17.

15. PREVAILING WAGE LAW AND MINIMUM HOURLY RATES

Federal or state wage rates and regulations, if required for this Project, will be as described in the Special Conditions.

16. AFFIRMATIVE ACTION PLAN

The successful Bidder must submit with their bid, the following items to the Urban County Government:

1. Affirmative Action Plan for his/her firm – see Part II

2. Current Work Force Analysis Form – see Part III

3. Good Faith Effort Documentation – see Part III

4. List of Disadvantaged Business Enterprise Subcontractors and the Dollar Value of each Subcontract – see Part III

A Work Force Analysis Form shall be submitted for each Contract. Failure to submit these items as required herein may result in disqualification of the Bidder from award of the Contract.

All submissions should be directed to:

Director, Division of Central Purchasing
Lexington-Fayette Urban County Government
200 East Main Street, Third Floor
Lexington, KY 40507

17. CONTRACT TIME

The number of calendar days within which the Work is to be substantially completed and ready for final payment (the Contract Time) is set forth in the Form of Proposal and the Agreement.

18. SUBSTITUTE OR "OR-EQUAL" ITEMS

The Contract, if awarded, will be on the basis of materials and equipment described in the Drawings or specified in the Specifications without consideration of possible substitute or "or-equal" items. Whenever it is indicated in the Drawings or specified in the Specifications that a substitute or "or-equal" item of material or equipment may be furnished or used by the CONTRACTOR if acceptable to the ENGINEER and OWNER, application for such acceptance will not be considered by the ENGINEER and OWNER until after the effective date of the Agreement. The procedure for submission of any such application by the CONTRACTOR and consideration by the ENGINEER and OWNER is set forth in the General Conditions.

19. BASIS OF BID–LUMP SUM BASE BID WITH BID ALTERNTAIVES

Bidders shall submit a Bid on a lump sum base bid basis. Bidder shall include a separate bid price for each bid alternative described in the Bidding Documents and as provided for in the Bid Form. The price for each bid alternative will be the amount to be added to or deducted from the price of the base bid if OWNER selects the bid alternative.

Failure to provide a separate price for each bid alternative may result in OWNER declaring Bid nonresponsive. Consideration of bid alternatives will be made prior to the Notice of Award.

Bid alternatives shall include the entire cost of the bid alternatives and equipment alternatives, including cost for engineering changes to accommodate the bid alternatives and equipment alternatives, and additional work to be performed which is not shown on the Drawings but which is required as a result of selection of the bid alternative and/or equipment alternative.

20. CASH ALLOWANCES

For cash allowances the Contract Price shall include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents. The final Contract Price will be adjusted to reflect actual costs on account of cash allowances

The following cash allowances shall be included in the Bid for Contract(s).

Project Soils Engineer	Section 02222–Excavation, Fill, Backfill, and Grading
Systems Integration	Section 16940–Controls

21. ALTERNATE BIDS

Bidders shall submit alternate bids/proposals only if and when such alternate bids/proposals have been specifically requested in an Invitation for Bids. If alternate bids/proposals are requested in an Invitation for Bids, the form of submission of such alternate bid and the conditions under which such alternate bids will be considered for award of a contract will be established in the Invitation.

Any Bidder who submits a bid incorporating an alternate proposal when alternate bids/proposals have not been requested in the Invitation for Bids shall have his/her bid rejected as non-responsive.

Any Bidder who submits a bid incorporating two (2) or more prices for an item or groups of items (unless such method of pricing is requested in the Invitation for Bids), or which imposes conditions for acceptance other than those established in the Invitation for Bids, shall have their bid rejected as non-responsive.

22. SIGNING OF AGREEMENT

When OWNER gives a Notice of Award to the successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement with all other written Contract Documents attached. Within ten days thereafter, CONTRACTOR shall sign and deliver the required number of counterparts of the Agreement and attached documents to OWNER with the required Bonds, Certificate of Insurance, and Power of Attorney. The OWNER will deliver one fully signed counterpart to CONTRACTOR at such time as it has been signed by the Mayor.

23. ASSISTANCE TO BE OFFERED T0 DISADVANTAGED BUSINESS ENTERPRISE (DBE) CONTRACTORS

I. Outreach

The Lexington-Fayette Urban County Government (LFUCG) maintains a mailing list of DBE contractors and organizations. When a LFUCG construction project is advertised for bidding, notices are sent to the entire mailing list. The notices describe the project, indicate the deadline for submitting bids, and review the bonding assistance which is available.

If you wish to be added to the LFUCG DBE contractor mailing list, please contact:

Sherita Miller
Division of Central Purchasing
Lexington-Fayette Urban County Government
200 East Main Street, Room 338
Lexington, Kentucky 40507

II. Bid Bond Assistance

For those DBE contractors who wish to bid on LFUCG project, bid bond assistance is available. This bid bond assistance is in the form of a "Letter of Certification" which is accepted by the LFUCG's Division of Purchasing, in lieu of a bid bond. The "Letter of Certification" must be included in the bid package when it is submitted to the Division of Purchasing. The "Letter of Certification" will reference the specific project for which the bid is being submitted, and the time and date on which the bid is due. Bid bond assistance must be requested from the Lexington-Fayette Urban County Government's Division of Central Purchasing.

III. Eligibility for Bid Bonding Assistance

In order to be eligible for any bid bonding assistance, a DBE construction company must be owned or controlled at the level of 51% or more, by a member or members of a minority group or females. Prior to receiving assistance, a statement providing evidence of ownership and control of the company by a member or members of a minority group or females must be signed by the OWNER or corporate officer and by an attorney or accountant and submitted to:

Sherita Miller
Division of Central Purchasing
Lexington-Fayette Urban County Government
200 East Main Street, Room 338
Lexington, Kentucky 40507

IV. Subcontractors

The LFUCG will, upon request, assist prime contractors in the procurement of eligible DBE subcontractors in an effort to achieve the 10% minimum DBE goal.

For a list of eligible DBE subcontractors please contact:

Sherita Miller
Division of Central Purchasing
Lexington-Fayette Urban County Government
200 East Main Street, Room 338
Lexington, Kentucky 40507

V. Questions

If you have questions or wish to have additional information, please contact:

Brian Marcum
Division of Central Purchasing
Lexington-Fayette Urban County Government
200 East Main Street, 3rd Floor
Lexington, Kentucky 40507
(859) 258-3320

END OF SECTION

PART III

FORM OF PROPOSAL

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PART III
FORM OF PROPOSAL

WEST HICKMAN WASTEWATER TREATMENT PLANT SCUM REMOVAL ADDITION AND AERATED SLUDGE HOLDING TANK NO. 3 COVER PROJECT
BID NO. 22-2018

Place: Lexington, Kentucky

Date: April 5, 2018

The following Form of Proposal shall be followed exactly in submitting a proposal for this Work.

This Proposal Submitted by Herrick Company, Inc.

2176 Waddy Road, Lawrenceburg, KY 40342
(Name and Address of Bidding Contractor)

(Hereinafter called "Bidder"), organized and existing under the laws of the State of Kentucky, doing business as a corporation "a corporation," "a partnership", or an "individual" as applicable.

To: Lexington-Fayette Urban County Government
(Hereinafter called "OWNER")
Office of the Director of Purchasing
200 East Main Street, 3rd Floor
Lexington, KY 40507

Gentlemen:

The Bidder, in compliance with your Invitation for Bids for the **WEST HICKMAN WASTEWATER TREATMENT PLANT SCUM REMOVAL ADDITION AND AERATED SLUDGE HOLDING TANK NO. 3 COVER PROJECT** having examined the Plans and Specifications with related documents, having examined the site for proposed Work, and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of materials and labor, hereby proposes to furnish all labor, materials, and supplies, and to construct the Project in accordance with the Contract Documents, within the time set forth therein, and at the lump sum and/or unit prices stated hereinafter. These prices are to cover all expenses incurred in performing the Work required under the Contract Documents, of which this proposal is a part. The OWNER will issue work orders for work to be performed under this Contract.

BIDDER hereby agrees to commence work under this contract on or before a date to be specified in the Notice to Proceed and to fully complete the project within the time provided in the Purchase Order or Work Orders issued by the OWNER. BIDDER further agrees to pay liquidated damages, the sum of **$1,500.00** for each consecutive calendar day thereafter.

The Bidder hereby acknowledges receipt of the following addenda:

Addendum No. 1 Date 3/29/18

Addendum No. ____ Date _____

Addendum No. ____ Date _____

Addendum No. ____ Date _____

Addendum No. ____ Date _____

Addendum No. ____ Date _____

Addendum No. ____ Date _____

Addendum No. ____ Date _____

Insert above the number and the date of any Addendum issued and received. If none has been issued and received, the word "NONE" should be inserted.

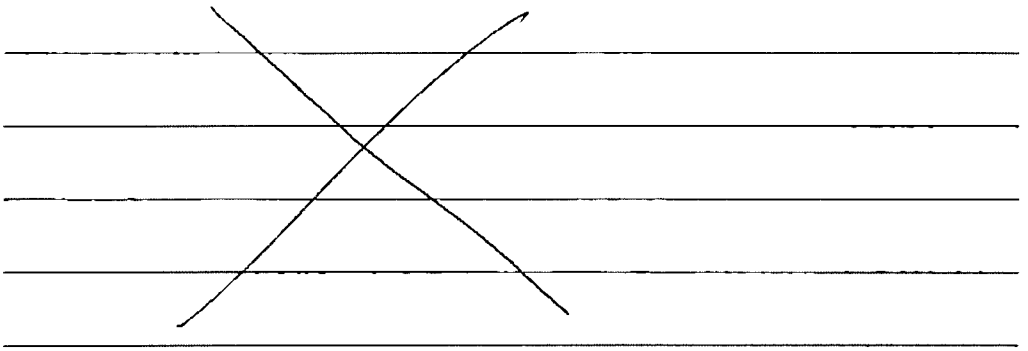
2. LEGAL STATUS OF BIDDER

Bidder HERRICK COMPANY, INC.

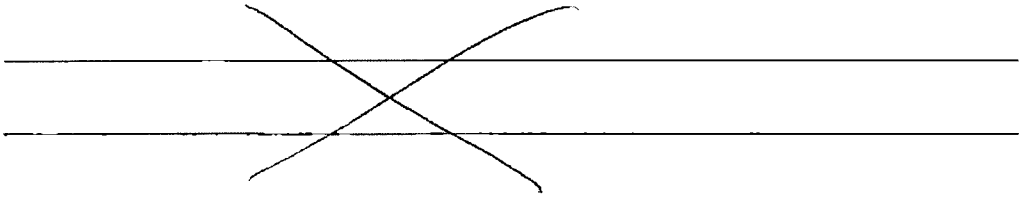
Date April 5, 2018

* 1. A corporation duly organized and doing business under the laws of the State of Kentucky, for whom Donna S. Herrick, bearing the official title of Chief Executive Officer, whose signature is affixed to this Bid/Proposal, is duly authorized to execute contracts.

* 2. A Partnership, all of the members of which, with addresses are: (Designate general partners as such)



* 3. An individual, whose signature is affixed to this Bid/Proposal (please print name)



*(The Bidder shall fill out the appropriate form and strike out the other two.)

3. BIDDERS AFFIDAVIT

Comes the Affiant, Donna S. Herrick, and after being first duly sworn, states under penalty of perjury as follows:

1. His/her name is Donna S. Herrick and he/she is the individual submitting the bid or is the authorized representative of Herrick Company, Inc., the entity submitting the bid (hereinafter referred to as "Bidder").

2. Bidder will pay all taxes and fees, which are owed to the Lexington-Fayette Urban County Government at the time the bid is submitted, prior to award of the contract and will maintain a "current" status in regard to those taxes and fees during the life of the contract.

3. Bidder will obtain a Lexington-Fayette Urban County Government business license, if applicable, prior to award of the contract.

4. Bidder has authorized the Division of Central Purchasing to verify the above-mentioned information with the Division of Revenue and to disclose to the Urban County Council that taxes and/or fees are delinquent or that a business license has not been obtained.

5. Bidder has not knowingly violated any provision of the campaign finance laws of the Commonwealth of Kentucky within the past five (5) years and the award of a contract to the Bidder will not violate any provision of the campaign finance laws of the Commonwealth.

6. Bidder has not knowingly violated any provision of Chapter 25 of the Lexington-Fayette Urban County Government Code of Ordinances, known as the "Ethics Act."

7. Bidder acknowledges that "knowingly" for purposes of this Affidavit means, with respect to conduct or to circumstances described by a statute or ordinance defining an offense, that a person is aware or should have been aware that his conduct is of that nature or that the circumstance exists.

Further, Affiant sayeth naught.

Donna S Herrick
(Affiant)

STATE OF Kentucky

COUNTY OF Anderson

The foregoing instrument was subscribed, sworn to and acknowledged before me by Donna S. Herrick on this the 5th day of April, 2018.

My Commission expires: March 2, 2019

Sabrina K Gabbard
NOTARY PUBLIC, STATE AT LARGE

4. LUMP SUM BID

The Bidder agrees to perform all the Work described in the Specifications and shown on the Plans for the following lump sum and/or unit prices which shall include the furnishing of all labor, materials, supplies, services, equipment and/or vehicle usage, all items of cost, overhead, taxes (federal, state, local), and profit for the CONTRACTOR and any Subcontractor involved. The Bidder must make the extensions and additions showing the total amount of bid. The contract, if awarded, will be on the basis of material and equipment specified in the specification without consideration of possible substitute or "Or equal" items. (Per article 18 of the Information for Bidders). The LFUCG reserves the right to award the bid in its best interest and within fiscal constraints.

Amount shall be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.

LUMP SUM BID:

One Million Fifty Eight Thousand (Words) Dollars $ 1,058,000 (Numbers)

See Section 01019–Contract Considerations for discussion of cash allowances to include in the Bid.

Contract award will be made based on the Lump Sum Base Bid or Lump Sum Base Bid with any combination of Bid Alternatives selected. The price for all Base Bid Equipment items shall be included in the Lump Sum Base Bid. Bid Alternatives will be added or deducted from the Lump Sum Base Bid, if they are accepted, prior to Notice of Award being made.

OWNER reserves the right to accept or reject any Bid Alternatives or Equipment Alternatives to the Lump Sum Base Bid. If Alternatives designated by the OWNER are considered in the Award, the Alternatives shall be accepted in the sequence identified below and the lowest Lump Sum Bid shall be computed on the Base Bid, plus any Bid Alternatives accepted. Should OWNER wish to consider Bid Alternatives listed, Bidder may be required to provide additional information prior to Notice of Award. Consideration of Equipment Alternatives of the selected Bidder will be made by OWNER within 60 days after the Effective Date of the Agreement.

If a Bid Alternative is selected by OWNER, the awarded Contract price will include the selected Alternative(s). The priority of selection for Alternatives shall be Bid Alternative No. 1, Bid Alternative No. 2A or Bid Alternative No. 2B, Bid Alternative No. 3A or Bid Alternative No. 3B.

BID ALTERNATIVE NO. 1:

CONTRACTOR shall include in the cost of the Bid Alternative ALL work associated with providing the scope listed below.

The price of $ 17,000 00 shall be added to the Contract Lump Sum Bid if OWNER elects to have CONTRACTOR provide and install a weir gate in each clarifier splitter box (2 total), as shown on Drawing 10-SM1.04.

BID ALTERNATIVE NO. 2A:

CONTRACTOR shall include in the cost of the Bid Alternative ALL work associated with providing the scope listed below.

The price of $ 149,000 00 shall be added to the Contract Lump Sum Bid if OWNER elects to have CONTRACTOR demolish existing spray bar and nozzles in Zone 1 aeration tanks (8 total) and install new spray bar of stainless steel pipe and nozzle assemblies as shown on Drawing 10-SM1.06.

BID ALTERNATIVE NO. 2B:

The price of $ 228,000 00 shall be added to the Contract Lump Sum Bid if OWNER elects to have CONTRACTOR demolish existing spray bar and nozzles in Zone 1 aeration tanks (8 total) and install new spray bar of ductile iron pipe and nozzle assemblies as shown on Drawing 10-SM1.06.

BID ALTERNATIVE NO. 3A:

CONTRACTOR shall include in the cost of the Bid Alternative ALL work associated with providing the scope listed below.

The price of $ 165,000 00 shall be added to the Contract Lump Sum Bid if OWNER elects to have CONTRACTOR demolish existing spray bar and nozzles in Zone 2 aeration tanks (6 total) and install new spray bar of stainless steel pipe and nozzle assemblies as shown on Drawings 10-SM1.07.

BID ALTERNATIVE NO. 3B:

CONTRACTOR shall include in the cost of the Bid Alternative ALL work associated with providing the scope listed below.

The price of $ 248,000 00 shall be added to the Contract Lump Sum Base Bid if OWNER elects to have CONTRACTOR demolish existing spray bar and nozzles in Zone 2 aeration tanks (6 total) and install new spray bar of ductile iron pipe and nozzle assemblies as shown on Drawings 10-SM1.07.

CASH ALLOWANCES

The following Cash Allowances shall be included in the Lump Sum Base Bid. The Cash Allowances for non-Lump Sum items shall be equal to the product of the quantity included in the Lump Sum Base Bid and the Unit Price. The Cash Allowances will be adjusted in the event that estimated quantities to be included in the Lump Sum Base Bid are different from final measured quantities. A single Unit Price shall be bid for each item. Failure to include one or more of the following Unit Price items may result in rejection of the entire Bid as nonconforming. For items with a quantity of 1, the Cash Allowance shall be adjusted based on actual final costs.

Item Number	Description	Estimated Quantity Included in the Lump Sum Base Bid	Unit	Bid Unit Price	Total Bid Price Included in the Lump Sum Base Bid
1.	Project Soils Engineer Section 02222	1	LS	$15,000	$15,000
2.	Systems Integration Section 16940	1	LS	$15,000	$15,000

Submitted by: HERRICK COMPANY, INC.

Firm

2176 Waddy Road

Address

Lawrenceburg Kentucky 40342

City, State & Zip

Bid must be signed:
(original signature)

Donna S Herrick CEO

Signature of Authorized Company Representative – Title

Donna S. Herrick

Representative/s Name (Typed or Printed)

502-839-3484 502-839-0939

Area Code – Phone – Extension *Fax #*

hci@dcr.net

E-Mail Address

OFFICIAL ADDRESS:

2176 Waddy Road

Lawrenceburg, KY 40342

_____ (Seal if Bid is by Corporation)

by signing this form you agree to ALL of the terms and associated forms.

5. STATEMENT OF BIDDER'S QUALIFICATIONS

The following statement of the Bidder's qualifications is required to be filled in, executed, and submitted with the Proposal:

1. Name of Bidder: Herrick Company, Inc.

2. Permanent Place of Business: 2176 Waddy Road, Lawrenceburg, KY 40342

3. When Organized: January 26, 1996

4. Where Incorporated: State of Kentucky

5. Construction Plant and Equipment Available for this Project:

See attached list

(Attach Separate Sheet If Necessary)

6. Financial Condition:

If specifically requested by the OWNER, the apparent low Bidder is required to submit its latest three (3) years audited financial statements to the OWNER'S Division of Central Purchasing within seven (7) calendar days following the bid opening.

7. In the event the Contract is awarded to the undersigned, surety bonds will be furnished by:

United Fire & Casualty Company, PO Box 73909, Cedar Rapids, IA 52407 (Surety)

Signed: Leigh McCarthy
Attorney-in-Fact (Representative of Surety)
Smith Mahus, 2307 River Road, Louisville, KY 40206

Herrick Company, Inc.
2176 Tracy Road
Lawrenceburg, KY 40342
502-839-3484
502-839-0939 Fax

Bid: West Hickman WWTP Scum Removal Addition & Aerated Sludge Holding Tank No. 3 Cover Project

Item 5.5 (Page P-10): Equipment Available

- 35 ton Crane
- 15 ton Boom Truck
- 50 ton Crane
- 15 ton P&H Crane
- CAT D5 Dozer
- CAT 953 Loader
- CAT 315 Excavator
- CAT 416 Backhoe
- CAT 420 Backhoe
- CAT 420E Backhoe
- CAT 302.5 Excavator
- Hyundai R35ZCR Mini-Excavator
- Bobcat Skid Steer Loader
- International Flat Bed Dump
- (2) 185 Air Compressors
- 6" Diesel Pump
- Kundel 8' x 20' trench box
- (8) pickup trucks
- Miscellaneous small equipment and tools

8. The following is a list of similar projects performed by the Bidder: (Attach separate sheet if necessary).

NAME	LOCATION	CONTRACT SUM
Please see attached schedule		

9. The Bidder has now under contract and bonded the following projects:

NAME	LOCATION	CONTRACT SUM
Please see attached schedule		

10. List Key Bidder Personnel who will work on this Project.

NAME	POSITION DESCRIPTION	NO. OF YEARS WITH BIDDER
Donna Herrick	CEO	22+
H. Douglas Herrick	President	22+
Sabrina Gabbard	Office Manager	12+
Ryan Gabbard	Project Manager	15+
Chad Holbrook	Superintendent	1/2
Samuel Thorpe	Superintendent	12
Eddie Johnson	Superintendent	19+
Larry Boian	Superintendent	19+

HERRICK COMPANY, INC.
Bid: West Hickman WWTP Scum Removal Addition
and Aerated Sludge Holding Tank No. 3 Cover Project
BID DATE: April 5, 2018

ITEM 8 - Page P-11

Name	Location	Contract Sum
GMWSS WWTP No. 1 Digester Sludge Pump Replacement	Georgetown, KY	$232,250.00
West Hickman WWTP Zone 2 Aeration Improvements	Nicholasville, KY	$531,400.00
WWTP Mechanical Bar Screen	Radcliff, KY	$227,700.00
WWTP Ultraviolet Disinfection System	Radcliff, KY	$404,400.00
WWTP Improvements - Chemical Feed & Phosphorus Removal	Hardinsburg, KY	$1,930,382.19
WWTP Generator & SCADA System Additions & Non-Potable Water System Upgrade and Line Replacement	Frankfort, KY	$2,279,000.00

HERRICK COMPANY, INC.
Bid: West Hickman WWTP Scum Removal Addition
and Aerated Sludge Holding Tank No. 3 Cover Project
BID DATE: April 5, 2018

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Name	Location	Contract Sum
WWTP Generator & SCADA System	Frankfort, KY	$2,279,000.00
WWTP Improvements / Chemical Feed & Phoosphorous Removal	Hardinsburg, KY	$1,930,389.19
Lincoln Trail Lift Station Rehabilitation Project	Radcliff, KY	$673,250.00
West Laurel New County Farm Pump Station	London, KY	$497,725.00
WTP Modifications - Contract 3	Lebanon, KY	$172,750.00
High Service Pump Station Replacement Valves	Frankfort, KY	$167,600.00
Wood Creek WTP Valve Replacement	Laurel County, KY	$111,250.00

Donna S Herrick, CEO
April 5, 2018

11. DBE Participation on current bonded projects under contract:

SUBCONTRACTORS (LIST)	PROJECT (SPECIFIC TYPE)	DBE	MAJORITY
See attached schedule			

(USE ADDITIONAL SHEETS IF NECESSARY)

12. We acknowledge that, if we are the apparent low Bidder, we will submit to the OWNER within 7 calendar days following the Bid Opening, a sworn statement on the OWNER'S form regarding all current work on hand and under contract, and a statement on the OWNER'S form of the experience of our officers, office management and field management personnel. Additionally, if requested by the OWNER, we will within 7 days following the request submit audited financial statements and loss history for insurance claims for the 3 most recent years (or a lesser period stipulated by the OWNER)—all in accordance with the Bid Documents.

HERRICK COMPANY, INC.
Bid: West Hickman WWTP Scum Removal Addition
and Aerated Sludge Holding Tank No. 3 Cover Project
BID DATE: April 5, 2018

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Subcontractor	Project (specific type)	DBE	% of Sub Work
J.L. Davis Electrical Contractor, Inc.	WWTP (Frankfort SCADA System)	N	99.00%
Richmond Mechanical, Inc.	WWTP (Frankfort SCADA System)	N	1.70%
McKinney Painting, Inc.	WWTP (Frankfort SCADA System)	Y	0.03%
Randle-Davies Construction Co., LLC	WWTP (Frankfort SCADA System)	N	0.01%
Timmons Electric Company	WWTP (Hardinsburg Improvements)	N	66.90%
McKinney Painting, Inc.	WWTP (Hardinsburg Improvements)	Y	21.50%
Samson Steel Corporation	WWTP (Hardinsburg Improvements)	N	9.40%
Nationwide Fence Company	WWTP (Hardinsburg Improvements)	N	2.20%
JSC Electric, Inc.	WTP (Wood Creek Valves)	N	52.60%
McKinney Painting, Inc.	WTP (Wood Creek Valves)	Y	47.40%
Complete Electrical Systems Inc.	WTP (W Laurel PS)	N	47.30%
McKinney Painting, Inc.	WTP (W Laurel PS)	Y	10.00%
Cave City Contracting	WTP (W Laurel PS)	N	12.50%
Hume Masonry	WTP (W Laurel PS)	N	30.20%
J.L. Davis Electrical Contractor, Inc.	WTP (Lincoln Trail PS)	N	55.70%
McKinney Painting, Inc.	WTP (Lincoln Trail PS)	Y	37.20%
The Fence Company, LLC	WTP (Lincoln Trail PS)	Y	7.10%
J.L. Davis Electrical Contractor, Inc.	WTP (HS PS Valves)	N	63.20%
McKinney Painting, Inc.	WTP (HS PS Valves)	Y	36.80%

6. LIST OF PROPOSED SUBCONTRACTORS

The following list of proposed subcontractors is required by the OWNER to be executed, completed and submitted with the BIDDER'S FORM OF PROPOSAL. All subcontractors are subject to approval of the Lexington-Fayette Urban County Government. Failure to submit this list completely filled out may be cause for rejection of bid.

BRANCH OF WORK - LIST EACH MAJOR ITEM Such as: Grading, bituminous paving, concrete, seeding and protection, construction staking, etc.	**SUBCONTRACTOR**	**DBE Yes/No**	**DBE % of Work**
1. ELECTRIC	Name: TEM Address: Lexington, Ky	Yes	8%
2. HVAC	Name: Richmond Mechanical Address: Richmond, Ky	No	
3. Painting	Name: McKinney Painting Address: Versailles, Ky	Yes	2%
4. PRE-ENGINEERED Bldg.	Name: Wicks Address: New Albany IND.	No	
5. FIRE SPRINKLERS	Name: Brown Sprinkers Address: Lexington, Ky	No	
6.	Name: Address:		
7.	Name: Address:		

(Attach additional sheet(s) if necessary.)

7. AUTHENTICATION OF BID AND STATEMENT OF NON-COLLUSION AND NON-CONFLICT OF INTEREST

I hereby swear (or affirm) under the penalty for false swearing:

1. That I am the Bidder (if the Bidder is an individual), a partner of the Bidder (if the Bidder is a partnership), or an officer or employee of the bidding corporation having authority to sign on its behalf (if the Bidder is a corporation):
2. That the attached bid has been arrived at by the Bidder independently, and has been submitted without collusion with, and without any agreement, understanding or planned common course of action, with any other contractor, vendor of materials, supplies, equipment or services described in the Invitation to Bid, designed to limit independent bidding or competition;
3. That the contents of the bid or bids have not been communicated by the Bidder or its employees or agents to any person not an employee or agent of the Bidder or its surety on any bond furnished, with the bid or bids, and will not be communicated to any such person, prior to the official opening of the bid or bids;
4. That the Bidder is legally entitled to enter into the contracts with the Lexington-Fayette Urban County Government, and is not in violation of any prohibited conflict of interest;
5. (Applicable to corporation only) That as a foreign corporation, we are registered with the Secretary of State, Commonwealth of Kentucky, and authorized to do business in the State _____ or, that as a domestic corporation, we are in good standing with the Secretary of State, Commonwealth of Kentucky __X__. Check the statement applicable.
6. This offer is for 60 calendar days from the date this bid is opened. In submitting the above, it is expressly agreed that, upon proper acceptance by the Lexington-Fayette Urban County Government of any or all items bid above, a contract shall thereby be created with respect to the items accepted.
7. That I have fully informed myself regarding the accuracy of the statements made in this statement.

READ CAREFULLY – SIGN IN SPACE BELOW - FAILURE TO SIGN INVALIDATES BID.

Signed by Donna S Herrick Donna S. Herrick, CEO

Firm Herrick Company, Inc.

Address 2176 Waddy Road

Lawrenceburg, KY 40342

Telephone 502-839-3484 Fax: 502-839-0939

Date April 5, 2018

8. **STATEMENT OF EXPERIENCE**

(this section must be completed or your bid will be considered as non-responsive)

See attached Schedule

NAME OF INDIVIDUAL: _____

POSITION/TITLE: _____

STATEMENT OF EXPERIENCE: _____

_____

_____

_____

NAME OF INDIVIDUAL: _____

POSITION/TITLE: _____

STATEMENT OF EXPERIENCE: _____

_____

_____

_____

NAME OF INDIVIDUAL: _____

POSITION/TITLE: _____

STATEMENT OF EXPERIENCE: _____

_____

_____

_____

NAME OF INDIVIDUAL: _____

POSITION/TITLE: _____

STATEMENT OF EXPERIENCE: _____

_____

_____

NAME OF INDIVIDUAL: _____

POSITION/TITLE: _____

STATEMENT OF EXPERIENCE: _____

_____

_____

See attached schedule

BY: Herrick Company, Inc.
Name of Firm

DATE: April 5, 2018

BY: Donna S Herrick
Donna S. Herrick

TITLE: Chief Executive Officer

* Include all officers, office management's, Affirmative Action officials, and field management personnel. (Attach separate sheets if necessary.)

BID: West Hickman WWTP Scum Removal Addition & Aerated Sludge Holding Tank No. 3 Cover Project

Item 8. Statement of Experience - Page P-15

Donna S. Herrick - Chief Executive Officer

HCI Start Date: 1/26/96 (Years in construction - 22)

Experience: Management, cost-tracking, asset acquisition, budgeting, financial planning, risk management and control, project analysis, corporate taxes, human resources and payroll, new business start-ups

---

H. Douglas Herrick - President

HCI Start Date: 1/26/96 (Years in construction - 46)

Experience: Management, SFR contract builder, carpentry, estimating, supervisor on water- and waste-water treatment projects, including new construction, renovation, maintenance and emergency work

---

Samuel G. Thorpe - Superintendent

HCI Start Date: 12/26/06 (Years in construction - 49)

Experience: Bridge construction, carpentry, equipment maintenance & control, environmental & safety officer, supervisor

---

Eddie R. Johnson - Superintendent

HCI Start Date: 5/22/99 (Years in construction - 47)

Experience: Carpentry, electrical, plumber, layout & design, supervisory

---

Ryan P. Gabbard - Project Manager / Superintendent

HCI Start Date: 12/30/00 (Years in construction - 18)

Experience: Laborer, rebar foreman, layout, carpentry, tower construction, supervisory; project manager

---

Larry T. Boian - Superintendent

HCI Start Date: 3/29/99 (Years in construction - 36)

Experience: Operator, rebar, carpentry, welding, supervisory

Chadrick D. Holbrook - Superintendent

HCI Start Date: 1/19/18 (Years in construction - 17)

Experience: Operator, carpentry,supervisory

Sabrina K. Gabbard - Office Manager

HCI Start Date: 10/09/06 (Years in construction - 12)

Experience: Payroll administrator, project reporting, equipment control & maintenance, payables & receivables, year-end information reporting, quarterly tax filing, field work as labor & forklift operator

---

BY: HERRICK COMPANY, INC.
DATE: April 5, 2018
BY: Donna S Herrick Donna S. Herrick
TITLE: Chief Executive Officer

9. EQUAL OPPORTUNITY AGREEMENT

The Law

* Title VII of the Civil Rights Act of 1964 (amended 1972) states that it is unlawful for an employer to discriminate in employment because of race, color, religion, sex, age (40-70 years) or national origin.
* Executive Order No. 11246 on Nondiscrimination under Federal contract prohibits employment discrimination by contractor and subcontractor doing business with the Federal Government or recipients of Federal funds. This order was later amended by Executive Order No. 11375 to prohibit discrimination on the basis of sex.
* Section 503 of the Rehabilitation Act of 1973 States:

  The Contractor will not discriminate against any employee or applicant for employment because of physical or mental handicap.
* Section 2012 of the Vietnam Era Veterans Readjustment Act of 1973 requires Affirmative Action on behalf of disabled veterans and veterans of the Vietnam Era by contractors having Federal Contracts.
* Section 206 (A) of Executive Order 12086, Consolidation of Contract Compliance Functions for Equal Employment Opportunity, states:

  The Secretary of Labor may investigate the employment practices of any Government contractor or sub-contractor to determine whether or not the contractual provisions specified in Section 202 of this order have been violated.

The Lexington-Fayette Urban County Government practices Equal Opportunity in recruiting, hiring and promoting. It is the Government's intent to affirmatively provide employment opportunities for those individuals who have previously not been allowed to enter into the mainstream of society. Because of its importance to the local Government, this policy carries the full endorsement of the Mayor, Commissioners, Directors, and all supervisory personnel. In following this commitment to Equal Employment Opportunity and because the Government is the benefactor of the Federal funds, it is both against the Urban County Government policy and illegal for the Government to let contracts to companies which knowingly or unknowingly practice discrimination in their employment practices. Violation of the above mentioned ordinances may cause a contract to be canceled and the contractor may be declared ineligible for future consideration.

Please sign this statement in the appropriate space acknowledging that you have read and understand the provisions contained herein. Return this document as part of your application packet.

Bidders

I/We agree to comply with the Civil Rights Laws listed above that govern employment rights of minorities, women, Vietnam veterans, handicapped, and aged persons.

Donna S Herrick

Signature Donna S. Herrick, CEO

Herrick Company, Inc.

Name of Business

The Entity (regardless of whether construction contractor, non-construction contractor or supplier) agrees to provide equal opportunity in employment for all qualified persons, to prohibit discrimination in employment because of race, color, creed, national origin, sex or age, and to promote equal employment through a positive, continuing program from itself and each of its sub-contracting agents. This program of equal employment opportunity shall apply to every aspect of its employment policies and practices.

The Kentucky equal Employment Opportunity Act of 1978 (KRS 45.560-45.640) requires that any count, city, town, school district, water district, hospital district, or other political subdivision of the state shall include in directly or indirectly publicly funded contracts for supplies, materials, services, or equipment hereinafter entered into the following provisions:

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

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, age or national origin;

(2) The contractor will state in all solicitations or advertisements for employees placed by or on behalf of the contractors that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, age or national origin;

(3) The contract will post notices in conspicuous places, available to employees and applicants for employment, setting forth the provisions of the non-discrimination clauses required by this section; and

(4) The contractor will send a notice to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding advising the labor union or workers' representative of the contractor's commitments under the nondiscrimination clauses.

The Act further provides:

KRS 45.610. Hiring minorities – Information required

a. For the length of the contract, each contractor shall hire minorities from other sources within the drawing area, should the union with which he has collective bargaining agreements be unwilling to supply sufficient minorities to satisfy the agreed upon goals and timetable.

b. Each contractor shall, for the length of the contract, furnish such information as required by KRS 45.560 to KRS 45.640 and by such rules, regulations and orders issued pursuant thereto and will permit access to all books and records pertaining to his employment practices and work sites by the contracting agency and the department for purposes of investigation to ascertain compliance with KRS 45.560 to 45.640 and such rules, regulations and orders issued pursuant thereto.

KRS 45.620. Action against contractor – Hiring of minority contractor or subcontractor

(1) If any contractor is found by the department to have engaged in an unlawful practice under this chapter during the course of performing under a contract or subcontract covered under KRS 45.560 to 45.640, the department shall so certify to the contracting agency and such certification shall be binding upon the contracting agency unless it is reversed in the course of judicial review.

(2) If the contractor is found to have committed an unlawful practice under KRS 45.560 to 45.640, the contracting agency may cancel or terminate the contract, conditioned upon a program for future compliance approved by the contracting agency and the department. The contracting agency may declare such a contractor ineligible to bid on further contracts with that agency until such time as the contractor complies in full with the requirements of KRS 45.560 - 45.640.

(3) The equal employment provisions of KRS 45.560 to 45.640 may be met in part by a contractor by subcontracting to a minority contractor or subcontractor. For the provisions of KRS 45.560 to 45.640, a minority contractor or subcontractor shall mean a business that is owned and controlled by one or more persons disadvantaged by racial or ethnic circumstances.

KRS 45.630 Termination of existing employee not required, when

Any provision of KRS 45.560 to 45.640 notwithstanding, no contractor shall be required to terminate an existing employee upon proof that that employee was employed prior to the date of the contract.

KRS 45.640 Minimum skills

Nothing in KRS 45.560 to 45.640 shall require a contractor to hire anyone who fails to demonstrate the minimum skills required to perform a particular job.

It is recommended that all of the provisions quoted above to be included as special conditions in each contract. In the case of a contract exceeding $250,000, the contractor is required to furnish evidence that his work-force in Kentucky is representative of the available work-force in the area from which he draws employees, or to supply an Affirmative Action plan which will achieve such representation during the life of the contract.

10. EQUAL EMPLOYMENT OPPORTUNITY AFFIRMATIVE ACTION POLICY

It is the policy of Herrick Company, Inc. to assure that all applicants for employment and all employees are treated on a fair and equitable basis without regard to their race, religion, sex, color, handicap, natural origin or age.

Such action shall include employment, promotion, demotion, recruitment or recruitment advertising, layoff or termination, rates of pay and other forms of compensation, and selection for training, whether apprenticeship and/or on-the-job-training.

Furthermore, this company agrees to make special recruitment efforts to hire the protected class whenever feasible. This company also agrees to adhere to all applicable federal, state, and local laws relating to Equal Employment Opportunity for all individuals.

Signature: Donna S Herrick Herrick Company, Inc.
(Bidding Contractor)

Title: Chief Executive Officer

Date: April 5, 2018

11. WORKFORCE ANALYSIS FORM

Name of Organization: Herrick Company, Inc. Date: April / 05 / 2018

Categories	Total	White		Black		Other		Total	
		M	F	M	F	M	F	M	F
Administrators	2	1	1					1	1
Professionals									
Superintendents	4	4						4	
Supervisors									
Foremen									
Technicians									
Protective Service									
Para-Professionals									
Office/Clerical	2	1	1					1	1
Skilled Craft	8	8						8	
Service/Maintenance									
Total:	16	14	2					14	2

Prepared By: Donna S Herrick CEO

Donna S. Herrick, Herrick Company, Inc.

12. EVIDENCE OF INSURABILITY

LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT CONSTRUCTION PROJECT
(Use separate form for each Agency or Brokerage agreeing to provide coverage)

Names Insured: Herrick Company, Inc. Employee ID: 61-1296034

Address: 1385 Tracy Road Phone: 502-839-3484

Lawrenceburg, KY 40342

Project to be insured: West Hickman Wastewater Treatment Plant Scum Removal Addition & Acrated Sludge Holding Tank No. 3 Cover Project Bid No. 22-2018

Lexington-Fayette Urban County Government, KY

In lieu of obtaining certificates of insurance at this time, the undersigned agrees to provide the above Named Insured with the minimum coverage listed below. These are outlined in the Insurance and Risk Management of Part V (Special Conditions), including all requirements, and conditions:

Section Items	Coverage	Minimum Limits and Policy Requirements	Limits Provided To Insured	Name of Insurer	A.M. Best's Code	A.M. Best's Rating
SC 1.3.D.1 – see provisions	CGL	$1,000,000 per occ. And $2,000,000 aggregate	$ 1,000,000/ 2,000,000	Cincinnati Insurance Co.	004289	A+:XV
SC 1.3.D.1 – see provisions	AUTO	$2,000,000/per occ.	$ 2,000,000	Cincinnati Insurance Co.	004289	A+:XV
SC 1.3.D.1 – see provisions	WC	Statutory w /endorsement as noted	$ ~~4,000,000 each accident~~ 4,000,000 disease/empl ~~4,000,000 disease/pol~~	Associated General Contractors of Kentucky	055002	A-:VII
	Umbrella		$ $5,000,000	Cincinnati Insurance Co.	004289	A+:XV

See excess liability below

Section 2 includes required provisions, statements regarding insurance requirements, and the undersigned agrees to abide by all provisions for the coverage's checked above unless stated otherwise when submitting.

J. Smith Lanier & Co., A Marsh & McLennan Agency LLC company
Agency or Brokerage

360 East Vine Street
Street Address

Lexington | KY | 40507
City | State | Zip

859-254-8023
Telephone Number

Chris Barnett
Name of Authorized Representative

Senior Vice President
Title

Authorized Signature

March 23, 2018
Date

NOTE: Authorized signatures may be the agent's if agent has placed insurance through an agency agreement with the insurer. If insurance is brokered, authorized signature must be that of authorized representative of insurer.

Excess Liability $5,000,000 Travelers Property & Casualty Co. 004461 A +-:XV

13. DEBARRED FIRMS

PROJECT NAME: **West Hickman Wastewater Treatment Plant Scum Removal Addition and Aerated Sludge Holding Tank No. 3 Cover Project**

BID NUMBER: **22-2018**

LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT
LEXINGTON, KY

All prime Contractors shall certify that Subcontractors have not and will not be awarded to any firms that has been debarred for noncompliance with the Federal Labor Standards, Title VI of the Civil Rights Act of 1964 As Amended, Executive Order 11246 As Amended or any other Federal Law.

All bidders shall complete the attached certification in duplicate and submit both copies to the Owner with the bid proposal. The Owner (grantee) shall transmit one copy to the Lexington-Fayette Urban County Government, Division of Community Development, within fourteen (14) days after bid opening.

The undersigned hereby certifies that the firm of Herrick Company, Inc. has not and will not award a subcontract, in connection with any contract award to it as the result of this bid, to any firm that has been debarred for noncompliance with the Federal labor Standards, Title VI of the civil Rights Act of 1964, Executive Order 11246 as amended or any Federal Law.

Herrick Company, Inc.
Name of Firm Submitting Bid

Donna S Herrick
Signature of Authorized Official Donna S. Herrick

Chief Executive Officer
Title

April 5, 2018
Date

14. DEBARMENT CERTIFICATION

All contractors/subcontractors shall complete the following certification and submit it with the bid proposal.

The contractor/subcontractor certifies in accordance with Executive Order 12549 (Debarment and Suspension 2/18/86) that to the best of its knowledge and belief, that it and its principals:

1) Are not presently debarred, suspended, proposed for debarment, declared negligible, or voluntarily excluded from covered transactions or contract by any Federal department or agency for noncompliance with the Federal Labor Standards, Title VI of the Civil Rights Act of 1964 as amended, Executive Order 11246 as amended or any other Federal law;

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

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

   c) Have not within a three year period preceding this bid has one or more public (Federal, State or local) transactions or contracts terminated for cause or default.

2) Where the contractor is unable to certify to any of the statements in this certification, such prospective contractors shall attach an explanation to this certification form.

Firm Name: TEM Group, Inc

Project: West Hickman WWTP Scum Removal Addition and Aerated Sludge Holding Tank No. 3 Cover Project

Printed Name and Title of Authorized Representative: Ron Boushey, CFO

Signature:

Date: April 5, 2018

END OF SECTION

14. DEBARMENT CERTIFICATION

All contractors/subcontractors shall complete the following certification and submit it with the bid proposal.

The contractor/subcontractor certifies in accordance with Executive Order 12549 (Debarment and Suspension 2/18/86) that to the best of its knowledge and belief, that it and its principals:

1) Are not presently debarred, suspended, proposed for debarment, declared negligible, or voluntarily excluded from covered transactions or contract by any Federal department or agency for noncompliance with the Federal Labor Standards, Title VI of the Civil Rights Act of 1964 as amended, Executive Order 11246 as amended or any other Federal law;

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

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

   c) Have not within a three year period preceding this bid has one or more public (Federal, State or local) transactions or contracts terminated for cause or default.

2) Where the contractor is unable to certify to any of the statements in this certification, such prospective contractors shall attach an explanation to this certification form.

Firm Name: Richmond Mechanical Inc.

Project: West Hickman WWTP Scum Removal Addition and Aerated Sludge Holding Tank No. 3 Cover Project

Printed Name and Title of Authorized Representative: William Richmond / President

Signature:

Date: April 5, 2018

END OF SECTION

14. DEBARMENT CERTIFICATION

All contractors/subcontractors shall complete the following certification and submit it with the bid proposal.

The contractor/subcontractor certifies in accordance with Executive Order 12549 (Debarment and Suspension 2/18/86) that to the best of its knowledge and belief, that it and its principals:

1) Are not presently debarred, suspended, proposed for debarment, declared negligible, or voluntarily excluded from covered transactions or contract by any Federal department or agency for noncompliance with the Federal Labor Standards, Title VI of the Civil Rights Act of 1964 as amended, Executive Order 11246 as amended or any other Federal law;

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

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

    c) Have not within a three year period preceding this bid has one or more public (Federal, State or local) transactions or contracts terminated for cause or default.

2) Where the contractor is unable to certify to any of the statements in this certification, such prospective contractors shall attach an explanation to this certification form.

Firm Name: McKinney Painting, Inc.

Project: West Hickman WWTP Scum Removal Addition and Aerated Sludge Holding Tank No. 3 Cover Project

Printed Name and Title of Authorized Representative: Clarissa Neal, Controller

Signature: Clarissa Neal

Date: April 5, 2018

END OF SECTION

14. DEBARMENT CERTIFICATION

All contractors/subcontractors shall complete the following certification and submit it with the bid proposal.

The contractor/subcontractor certifies in accordance with Executive Order 12549 (Debarment and Suspension 2/18/86) that to the best of its knowledge and belief, that it and its principals:

1) Are not presently debarred, suspended, proposed for debarment, declared negligible, or voluntarily excluded from covered transactions or contract by any Federal department or agency for noncompliance with the Federal Labor Standards, Title VI of the Civil Rights Act of 1964 as amended, Executive Order 11246 as amended or any other Federal law;

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

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

   c) Have not within a three year period preceding this bid has one or more public (Federal, State or local) transactions or contracts terminated for cause or default.

2) Where the contractor is unable to certify to any of the statements in this certification, such prospective contractors shall attach an explanation to this certification form.

Firm Name: Brown Sprinkler

Project: West Hickman WWTP Scum Removal Addition and Aerated Sludge Holding Tank No. 3 Cover Project

Printed Name and Title of Authorized Representative: Huey R. Adams

Signature:

Date: April 5, 2018

END OF SECTION

AIA® Document A310™ – 2010

Bid Bond

CONTRACTOR:
(Name, legal status and address)
Herrick Company, Inc.
2176 Waddy Road
Lawrenceburg, KY 40342

SURETY:
(Name, legal status and principal place of business)
United Fire & Casualty Company
PO Box 73909
Cedar Rapids, IA 52407-3909

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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

OWNER:
(Name, legal status and address) Lexington-Fayette Urban County Government
200 East Main Street
Lexington, KY 40507

BOND AMOUNT: Five Percent of the Amount Bid
($ 5% of Bid)

PROJECT:
(Name, location or address, and Project number, if any)
West Hickman Wastewater Treatment Plant, Scum Removal Addition and Aerated Sludge Holding Tank No. 3 Cover Project

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this 5th day of April 2018

Ryan P Hubbard
(Witness)

Herrick Company, Inc. Donna S Herrick *(Seal)*
(Principal)
Chief Executive Officer
(Title)

Lee Kemp
(Witness)

United Fire & Casualty Company
(Surety) Leigh McCarthy *(Seal)*
(Title) Leigh McCarthy
Attorney-In-Fact

Init.
/

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081110

UNITED FIRE & INDEMNITY COMPANY, WEBSTER, TX
FINANCIAL PACIFIC INSURANCE COMPANY, ROCKLIN, CA
CERTIFIED COPY OF POWER OF ATTORNEY
(original on file at Home Office of Company – See Certification)

118 Second Ave SE
Cedar Rapids, IA 52401

KNOW ALL PERSONS BY THESE PRESENTS, That UNITED FIRE & CASUALTY COMPANY, a corporation duly organized and existing under the laws of the State of Iowa; UNITED FIRE & INDEMNITY COMPANY, a corporation duly organized and existing under the laws of the State of Texas; and FINANCIAL PACIFIC INSURANCE COMPANY, a corporation duly organized and existing under the laws of the State of California (herein collectively called the Companies), and having their corporate headquarters in Cedar Rapids, State of Iowa, does make, constitute and appoint JAMES T. SMITH, JAMES H. MARTIN, BROOK T. SMITH, RAYMOND M. HUNDLEY, DEBORAH NEICHTER, BONNIE J. ROWE, MICHELE LACROSSE, SUMMER BETTING, JASON CROMWELL, LEIGH MCCARTHY, EACH INDIVIDUALLY of LOUISVILLE KY

their true and lawful Attorney(s)-in-Fact with power and authority hereby conferred to sign, seal and execute in its behalf all lawful bonds, undertakings and other obligatory instruments of similar nature provided that no single obligation shall exceed $75,000,000.00 and to bind the Companies thereby as fully and to the same extent as if such instruments were signed by the duly authorized officers of the Companies and all of the acts of said Attorney, pursuant to the authority hereby given and hereby ratified and confirmed.

The Authority hereby granted shall expire the 1st day of August, 2018 unless sooner revoked by UNITED FIRE & CASUALTY COMPANY, UNITED FIRE & INDEMNITY COMPANY, AND FINANCIAL PACIFIC INSURANCE COMPANY.

This Power of Attorney is made and executed pursuant to and by authority of the following bylaw duly adopted on May 15, 2013, by the Boards of Directors of UNITED FIRE & CASUALTY COMPANY, UNITED FIRE & INDEMNITY COMPANY, and FINANCIAL PACIFIC INSURANCE COMPANY.

"Article VI – Surety Bonds and Undertakings"

Section 2, Appointment of Attorney-in-Fact. "The President or any Vice President, or any other officer of the Companies may, from time to time, appoint by written certificates attorneys-in-fact to act in behalf of the Companies in the execution of policies of insurance, bonds, undertakings and other obligatory instruments of like nature. The signature of any officer authorized hereby, and the Corporate seal, may be affixed by facsimile to any power of attorney or special power of attorney or certification of either authorized hereby; such signature and seal, when so used, being adopted by the Companies as the original signature of such officer and the original seal of the Companies, to be valid and binding upon the Companies with the same force and effect as though manually affixed. Such attorneys-in-fact, subject to the limitations set forth in their respective certificates of authority shall have full power to bind the Companies by their signature and execution of any such instruments and to attach the seal of the Companies thereto. The President or any Vice President, the Board of Directors or any other officer of the Companies may at any time revoke all power and authority previously given to any attorney-in-fact.

IN WITNESS WHEREOF, the COMPANIES have each caused these presents to be signed by its vice president and its corporate seal to be hereto affixed this 1st day of August, 2016

UNITED FIRE & CASUALTY COMPANY
UNITED FIRE & INDEMNITY COMPANY
FINANCIAL PACIFIC INSURANCE COMPANY

By: Dennis J. Richmann Vice President

State of Iowa, County of Linn, ss:
On 1st day of August, 2016, before me personally came Dennis J. Richmann to me known, who being by me duly sworn, did depose and say; that he resides in Cedar Rapids, State of Iowa; that he is a Vice President of UNITED FIRE & CASUALTY COMPANY, a Vice President of UNITED FIRE & INDEMNITY COMPANY, and a Vice President of FINANCIAL PACIFIC INSURANCE COMPANY the corporations described in and which executed the above instrument; that he knows the seal of said corporations; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said corporations and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said corporations.

Judith A. Davis
Iowa Notarial Seal
Commission number 173041
My Commission Expires 04/23/2018

Judith A Davis Notary Public
My commission expires: 04/23/2018

I, David A. Lange, Secretary of UNITED FIRE & CASUALTY COMPANY and Assistant Secretary of UNITED FIRE & INDEMNITY COMPANY, and Assistant Secretary of FINANCIAL PACIFIC INSURANCE COMPANY, do hereby certify that I have compared the foregoing copy of the Power of Attorney and affidavit, and the copy of the Section of the bylaws and resolutions of said Corporations as set forth in said Power of Attorney, with the ORIGINALS ON FILE IN THE HOME OFFICE OF SAID CORPORATIONS, and that the same are correct transcripts thereof, and of the whole of the said originals, and that the said Power of Attorney has not been revoked and is now in full force and effect.

In testimony whereof I have hereunto subscribed my name and affixed the corporate seal of the said Corporations this 5th day of April, 2018.

By: David A. Lange
Secretary, UF&C
Assistant Secretary, UF&I/FPIC

PART IV

GENERAL CONDITIONS

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END OF SECTION

PART IV

GENERAL CONDITIONS

1. DEFINITIONS

Wherever used in these General Conditions or the other Contract Documents, the following terms have the meanings indicated which are applicable to both the singular and plural thereof.

1.1 Addenda
Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bid Documents or the Contract Documents.

1.2 Agreement
The written agreement between OWNER and CONTRACTOR covering the Work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.

1.3 Application for Payment
The form accepted by ENGINEER which is to be used by CONTRACTOR in requesting progress or final payments and which is to include such supporting documentation as is required by the Contract Documents.

1.4 Bid
The offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

1.5 Bidder
An individual, partnership, or corporation, who submit a Bid for a prime contract with the OWNER, for the Work described in the proposed Contract Documents.

1.6 Bonds
Bid, performance and payment bonds and other instruments of security.

1.7 Calendar Day
A calendar day of twenty-four hours measured from midnight to the next midnight shall constitute a day.

1.8 Change Order
A document recommended by ENGINEER, which is signed by CONTRACTOR and OWNER and authorizes an addition, deletion or revision in the Work, or an adjustment in the Contract Price or the Contract Time, issued on or after the Effective Date of the Agreement.

1.9 Contract Documents

The Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR'S Bid (including documentation accompanying the Bid and any post-bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Bonds, these General Conditions, the Special Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all amendments, modifications and supplements.

1.10 Contract Unit Price

The monies payable by OWNER to CONTRACTOR under the Contract Documents as stated in the Agreement. Unit Prices are to be firm for the term of this Contract. Price Increase will only be allowed at Contract Renewal.

1.11 Contract Time

The number of consecutive calendar days between the date of issuance of the Notice to Proceed and the contract completion date.

1.12 CONTRACTOR

The person, firm or corporation with whom OWNER has entered into the Agreement.

1.13 Defective

An adjective which when modifying the word Work refers to Work that is unsatisfactory, faulty or deficient, or does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or has been damaged prior to ENGINEER'S recommendation of final payment (unless responsibility for the protection thereof has been assumed by OWNER).

1.14 Drawings

The drawings which show the character and scope of the Work to be performed and which have been prepared or approved by ENGINEER and are referred to in the Contract Documents.

1.15 Effective Date of the Agreement

The date indicated in the Agreement on which it becomes effective.

1.16 ENGINEER

The Lexington-Fayette Urban County Government Division of Water Quality or its authorized representative.

1.17 Field Order

A documented order issued by ENGINEER which orders minor changes in the Work, but which does not involve a change in the Contract Price or the Contract Time.

1.18 Giving Notice

Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

1.19 Laws and Regulations

Laws, rules, regulations, ordinances, codes and/or orders.

1.20 Notice of Award

The written notice by OWNER to the apparent successful bidder stating that upon compliance by the apparent successful bidder with the conditions enumerated therein, within the time specified, OWNER will sign and deliver the Agreement.

1.21 Notice to Proceed

A written notice given by OWNER to CONTRACTOR fixing the date on which the Contract Time will commence to run and on which CONTRACTOR shall start to perform CONTRACTOR'S obligations under the Contract Documents.

1.22 OWNER

The Lexington-Fayette Urban County Government.

1.23 Partial Utilization

Placing a portion of the Work in service for the purpose for which it is intended (or related purpose) before reaching Completion for all the Work.

1.24 Project

The total construction of which the Work to be provided under the Contract Documents may be the whole, or a part as indicated elsewhere in the Contract Documents.

1.25 Inspector

The authorized representative of the ENGINEER who is assigned to the site or any part thereof.

1.26 Shop Drawings

All drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for CONTRACTOR to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a Supplier and submitted by CONTRACTOR to illustrate material or equipment for some portion of the Work.

1.27 Specifications
Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.

1.28 Standard Specifications
The "Standard Specifications for Road and Bridge Construction", Transportation Cabinet, Department of Highways, Commonwealth of Kentucky, current edition. MUTCD shall refer to the "Manual of Uniform Traffic Control Devices.

1.29 Subcontractor
An individual, firm or corporation having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the site.

1.30 Special Conditions
The part of the Contract Documents which amends or supplements these General Conditions.

1.31 Supplier
A manufacturer, fabricator, supplier, distributor, material man or vendor.

1.32 Underground Facilities
All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

1.33 Unit Price Work
Not Applicable

1.34 Work
The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work is the result of performing services, furnishing labor and furnishing and incorporating materials and equipment into the construction, all as required by the Contract Documents.

1.35 Time Period
When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

2. PRELIMINARY MATTERS

2.1 Delivery of Bonds

When the CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER, such Bonds, Insurance Certificate, and Power of Attorney as CONTRACTOR may be required to furnish.

2.2 Copies of Documents

Owner shall furnish to CONTRACTOR up to three copies (unless otherwise specified in the Special Conditions) of the Contract Documents as are reasonably necessary for the execution of the Work. Additional copies will be furnished, upon request, at the cost of reproduction.

2.3 Commencement of Contract Time; Notice to Proceed

The Contract Time will commence to run on the day specified in the Notice to Proceed.

2.4 Starting the Project

CONTRACTOR shall start to perform the Work on the date when the Contract Time commences to run, but no Work shall be done at the site prior to the date on which the Contract Time commences to run.

2.5 Before Starting Construction

Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. CONTRACTOR shall promptly report in writing to ENGINEER any conflict, error or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from ENGINEER before proceeding with any Work affected thereby; however, CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any conflict, error or discrepancy in the Contract Documents, unless CONTRACTOR had actual knowledge thereof or should reasonably have known thereof.

2.6 Submittal of Schedules

Within ten days after the effective date of the Agreement (unless otherwise specified) CONTRACTOR shall submit to ENGINEER for review:

2.6.1 an estimated progress schedule indicating the starting and completion dates of the various stages of the Work;

2.6.2 a preliminary schedule of Shop Drawing submissions; and

2.6.3 a preliminary schedule of values for all of the Work which will include quantities and prices of items aggregating the Contract Price and will subdivide the Work into component parts in sufficient detail to serve as the

basis for progress payments during construction. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work which will be confirmed in writing by CONTRACTOR at the time of submission.

2.7 Preconstruction Conference

Before CONTRACTOR starts the Work at the proposed site, a conference attended by CONTRACTOR, ENGINEER, EEO-Affirmative Action Officer, and other appropriate parties will be held to discuss the following issues: (1) The scheduling of the Work to be completed; (2) The procedures for handling shop drawings and other submittals; (3) The processing of applications for payment; (4) The establishment of an understanding among the involved parties in regard to the proposed project; and (5) The establishment of procedures for effectively implementing the LFUCG's 10% minimum DBE goals.

2.8 Finalizing Schedules

At least ten days before submission of the first Application for Payment a conference attended by CONTRACTOR, ENGINEER and others as appropriate will be held to finalize the schedules submitted in accordance with paragraph 2.6. The finalized progress schedule will be acceptable to ENGINEER as providing orderly progression of the Work to completion within the Contract Time, but such acceptance will neither impose on ENGINEER responsibility for the progress or scheduling of the Work nor relieve CONTRACTOR from full responsibility thereof. The finalized schedule of Shop Drawing submissions will be acceptable to ENGINEER as providing a workable arrangement for processing the submissions. The finalized schedule of values will be acceptable to ENGINEER as to form and substance.

3. CONTRACT DOCUMENTS: INTENT, CONFLICTS, AMENDING AND REUSE

3.1 General

The Contract Documents comprise the entire agreement between OWNER and CONTRACTOR concerning the Work. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the law of the place of the Project.

3.2 Intent

It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any Work, materials or equipment that may reasonably be inferred from the Contract Documents as being required to produce the intended result will be supplied whether or not specifically called for. When words which have a well-known technical or trade meaning are used to describe Work, materials or equipment such words shall be interpreted in accordance with that meaning. Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the laws or

regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code or laws or regulations in effect at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of OWNER, CONTRACTOR or ENGINEER, or any of their consultants, agents or employees from those set forth in the Contract Documents, nor shall it be effective to assign to ENGINEER, or any of ENGINEER'S consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 8.12.3 or 8.12.4. Clarifications and interpretations of the Contract Documents shall be issued by ENGINEER as provided in paragraph 8.4.

3.3 Conflicts

If, during the performance of the Work, CONTRACTOR finds a conflict, error or discrepancy in the Contract Documents, CONTRACTOR shall so report to ENGINEER in writing at once and before proceeding with the Work affected thereby shall obtain a written interpretation or clarification from ENGINEER; however, CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any conflict, error or discrepancy in the Contract Documents unless CONTRACTOR had actual knowledge thereof or should reasonably have known thereof.

In resolving such conflicts, errors and discrepancies, the documents shall be given precedence in the following order:

1. Agreement
2. Field and Change Orders
3. Addenda
4. Special Conditions
5. Instruction to Bidders
6. General Conditions
7. Specifications and Drawings

Figure dimension on drawings shall govern over scale dimensions and detailed Drawings shall govern over general Drawings.

3.4 Amending and Supplementing Contract Documents

The Contract Documents may be amended to provide for additions, deletions and revisions in the Work or to modify the terms and conditions thereof by means of a Change Order or a Field Order. Contract Price and Contract Time may only be changed by a Change Order.

3.5 Reuse of Documents

Neither CONTRACTOR nor any Subcontractor or Supplier or other person or organization performing or furnishing any of the Work under a direct or indirect contract with OWNER shall have or acquire any title to or ownership rights in any of the Drawings, Specifications or other documents (or copies of any thereof) prepared by or bearing the seal of ENGINEER; and they shall not reuse any of them on extensions of the Project or any other project without written consent of OWNER and ENGINEER and specific written verification or adaptation by ENGINEER.

4. AVAILABILITY OF LANDS; PHYSICAL CONDITIONS, REFERENCE POINTS

4.1 Availability of Lands

OWNER shall furnish, as indicated in the Contract Documents, the lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and such other lands which are designated for the use of CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by OWNER, unless otherwise provided in the Contract Documents. If CONTRACTOR believes that any delay in OWNER'S furnishing these lands, rights-of-way or easements entitles CONTRACTOR to an extension of the Contract Time, CONTRACTOR may make a claim therefore as provided in Article 11. ENGINEER shall determine if the claim is legitimate or not. CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.2 Physical Conditions

4.2.1 Subsurface Conditions

CONTRACTOR shall have full responsibility with respect to subsurface conditions at the site.

4.2.2 Existing Structures

CONTRACTOR shall have full responsibility with respect to physical conditions in or relating to existing surface and subsurface structures.

4.3 Physical Conditions-Underground Facilities

4.3.1 Shown or Indicated

The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site is based on information and data furnished to OWNER or ENGINEER by the owners of such underground facilities or by others. Unless it is otherwise expressly provided in the Special Conditions:

4.3.1.1 OWNER and ENGINEER shall not be responsible for the accuracy or completeness of any such information or data; and,

4.3.1.2 CONTRACTOR shall have full responsibility for reviewing and checking all such information and data; for locating all underground facilities shown or indicated in the Contract Documents; for coordination of the Work with the owners of such underground facilities during construction; and for the safety and protection thereof and repairing any damage thereto resulting from the Work, the cost of all of which will be considered as having been included in the Contract Price.

4.3.2 Not Shown or Indicated

If an underground facility is uncovered or revealed at or contiguous to the site which was not shown or indicated in the Contract Documents and which CONTRACTOR could not reasonably have been expected to be aware of, CONTRACTOR shall, promptly after becoming aware thereof and before performing any Work affected thereby (except in an emergency), identify the owner of such Underground Facility and give written notice thereof to that owner and to OWNER and ENGINEER. ENGINEER will promptly review the underground facility to determine the extent to which the Contract Documents should be modified to reflect and document the consequences of the existence of the Underground Facility, and the Contract Documents will be amended or supplemented to the extent necessary. During such time, CONTRACTOR shall be responsible for the safety and protection of such underground facility. CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, to the extent that they are attributable to the existence of any underground facility that was not shown or indicated in the Contract Documents and which CONTRACTOR could not reasonably have been expected to be aware of.

4.4 Reference Points

OWNER shall provide engineering surveys to establish reference points for construction which in ENGINEER'S judgment are necessary to enable CONTRACTOR to proceed with the Work. CONTRACTOR shall be responsible for laying out the Work (unless otherwise specified), shall protect and preserve the established reference points and shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall report to ENGINEER whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points by a Registered Land Surveyor.

5. CONTRACTOR'S RESPONSIBILITIES

5.1 Supervision

CONTRACTOR shall supervise and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. CONTRACTOR shall assure that all CONTRACTOR personnel (including

subcontractors, etc.) conduct themselves in a courteous and respectful manner toward the ENGINEER and the general public. Failure to comply with this condition of the Contract will result in immediate suspension of the Work. Following a review by the Commissioner of Public Works, the Contract may be terminated (see GC section 14). CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences and procedures of construction, but CONTRACTOR shall not be responsible for the negligence of others in the design or selection of a specific means, method, technique, sequence or procedure of construction which is indicated in and required by the Contract Documents. CONTRACTOR shall be responsible to see that the finished Work complies accurately with the Contract Documents.

5.2 Superintendence

CONTRACTOR shall keep on the Work at all times during its progress a competent resident superintendent, who shall not be replaced without written notice to OWNER and ENGINEER except under extraordinary circumstances. The superintendent will be CONTRACTOR'S representative at the site and shall have authority to act on behalf of CONTRACTOR. All communications given to the superintendent shall be as binding as if given to CONTRACTOR.

5.3 Labor

CONTRACTOR shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the site. Except in connection with the safety or protection of persons or the Work or property at the site or adjacent thereto, and except as otherwise indicated in the Contract Documents, all Work at the site shall be performed during regular working hours, and CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday or any legal holiday without OWNER'S written consent given after prior written notice to ENGINEER.

5.4 Start-Up and Completion of Work

Unless otherwise specified, CONTRACTOR shall furnish and assume full responsibility for all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.

5.5 Materials and Equipment

All materials and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. If required by ENGINEER, CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable supplier except as otherwise provided in the

Contract Documents; but no provision of any such instructions will be effective to assign to ENGINEER, or any of ENGINEER'S consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 8.12.3 or 8.12.4.

5.5.1 Not Clearly Specified or Indicated

In all instances where materials specified are obtainable in different sizes, weights, trade grades, qualities or finishes, etc., whose weights, trade grades, qualities or finishes, etc., are not clearly specified or indicated on the Drawings, the CONTRACTOR shall notify the ENGINEER of all such instances at least five (5) days in advance of receiving the proposals. The Engineer will then determine which size, weight, trade grade, quality, finish, etc., is required.

5.5.2 Coordination of Work

The CONTRACTOR shall see that for his own Work and for the work of each subcontractor, proper templates and patterns necessary for the coordination of the various parts of the Work are prepared. The CONTRACTOR shall furnish or require the Subcontractor to furnish such duplicates as will enable the Subcontractors to fit together and execute fully their respective portions of the Work.

5.6 Adjusting Progress Schedule

CONTRACTOR shall submit to ENGINEER for acceptance (to the extent indicated in paragraph 2.8) adjustments in the progress schedule to reflect the impact thereon of new developments; these will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the Contract Documents applicable thereto

5.7 Substitutes or "Or-Equal" Items

5.7.1 General

Whenever materials or equipment are specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular supplier, the naming of the item is intended to establish the type, function, and quality required. Unless the name is followed by words indicating that no substitution is permitted, materials or equipment of other Suppliers may be accepted by OWNER/ENGINEER if sufficient information is submitted by CONTRACTOR to allow OWNER/ENGINEER to determine that the material or equipment proposed is equivalent or equal to that named. The procedure for review by OWNER/ENGINEER will include the following. Requests for review of substitute items of material and equipment will not be accepted by OWNER/ENGINEER from anyone, other than CONTRACTOR. If CONTRACTOR wishes to furnish or use a substitute item of material or

equipment, CONTRACTOR shall make written application to OWNER/ENGINEER for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified. The application will state that the evaluation and acceptance of the proposed substitute will not prejudice CONTRACTOR'S achievement of completion on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which shall be considered by OWNER/ENGINEER in evaluating the proposed substitute. OWNER/ENGINEER may require CONTRACTOR to furnish at CONTRACTOR'S expense additional data about the proposed substitute.

5.7.2 Substitutes

If a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to OWNER/ENGINEER, if CONTRACTOR submits sufficient information to allow OWNER/ENGINEER to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents. The procedure for review by OWNER/ENGINEER will be similar to that provided in paragraph 5.7.1 as applied by OWNER/ENGINEER.

5.7.3 OWNER/ENGINEER'S Approval

OWNER/ENGINEER will be allowed a reasonable time within which to evaluate each proposed substitute. OWNER/ENGINEER will be the sole judge of acceptability, and no substitute will be ordered, installed or utilized without OWNER/ENGINEER'S prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. OWNER may require CONTRACTOR to furnish at CONTRACTOR'S expense a special performance guarantee or other surety with respect to any substitute. OWNER/ENGINEER will record time required by OWNER/ENGINEER and OWNER/ENGINEER'S consultants in evaluating substitutions proposed by CONTRACTOR and in making changes in the Contract Documents occasioned thereby. Whether or not OWNER/ENGINEER accepts a proposed substitute, CONTRACTOR

shall reimburse OWNER for the charges of OWNER/ENGINEER and OWNER/ENGINEER'S consultants for evaluating each proposed substitute.

5.8 Subcontractors, Suppliers, and Others

5.8.1 Acceptable to ENGINEER

CONTRACTOR shall not employ any Subcontractor, Supplier or other person or organization (including those acceptable to OWNER and ENGINEER as indicated in paragraph 5.8.2), whether initially or as a substitute, against whom OWNER or ENGINEER may have reasonable objection. CONTRACTOR shall not be required to employ any Subcontractor, Supplier or other person or organization to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection.

5.8.2 Objection After Due Investigation

If the Contract Documents require the identity of certain Subcontractors, Suppliers or other persons or organizations (including those who are to furnish the principal items of materials and equipment) to be submitted to OWNER in advance of the specified date prior to the Effective Date of the Agreement for acceptance by OWNER and ENGINEER and if CONTRACTOR has submitted a list thereof, OWNER'S or ENGINEER'S acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the bidding documents or the Contract Documents) of any such Subcontractor, Supplier or other person or organization so identified may be revoked on the basis of reasonable objection after due investigation, in which case CONTRACTOR shall submit an acceptable substitute. No acceptance by OWNER or ENGINEER of any such Subcontractor, Supplier or other person or organization shall constitute a waiver of any right of OWNER or ENGINEER to reject defective Work.

5.8.3 Contractor Responsible for Acts of Subcontractors

The CONTRACTOR shall perform on the site, and with its own organization, work equivalent to at least fifty (50) percent of the total amount of Work to be performed under the Contract. This percentage may be reduced by a supplemental agreement to this Contract if, during performing the Work, the CONTRACTOR requests a reduction and the Urban County Engineer determines that the reduction would be to the advantage of the Urban County Government.

The CONTRACTOR shall, at the time he submits his proposal for the Contract, notify the OWNER in writing of the names of Subcontractors proposed for the Work. He shall not employ any Subcontractor without the prior written approval of the OWNER.

CONTRACTOR shall be fully responsible to OWNER and ENGINEER for all acts and omissions of the Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR just as CONTRACTOR is responsible for CONTRACTOR'S own acts and omissions. Nothing in the Contract Documents shall create any contractual relationship between OWNER or ENGINEER and any such Subcontractor, Supplier or other person or organization, nor shall it create any obligation on the part of OWNER or ENGINEER to pay or to see to the payment of any moneys due any such Subcontractor, Supplier or other person or organization except as may otherwise be required by Laws and Regulations.

5.8.4 Division of Specifications

The divisions and sections of the Specifications and the identifications of any Drawings shall not control CONTRACTOR in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

5.8.5 Agreement Between Contractor and Subcontractors

All Work performed for CONTRACTOR by a Subcontractor will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor which specifically binds the Subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and ENGINEER.

5.8.6 Statements and Comments by CONTRACTOR

Neither the CONTRACTOR, his employees, nor his subcontractors shall at any time make any statement or comment as to the project scope, nature, intention, design, or construction method to any third party or parties without the explicit written consent of the OWNER.

Any third party requesting such information shall be referred to the OWNER or his representative.

Should there be any change from the original intent of the project as a result of any statement or comment by the contractor, his employees or subcontractors, contractor shall be held liable for any change in the scope, nature, design, or construction method and shall bear the full cost for the previously mentioned changes.

5.9 Patent Fees and Royalties

CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product or device which is the subject of patent rights or copyrights held by others.

5.10 Permits

Unless otherwise provided in the Special conditions, CONTRACTOR shall obtain and pay for all construction permits and licenses. OWNER shall assist CONTRACTOR, when necessary, in obtaining such permits and licenses. CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of opening of Bids, or if there are no Bids on the Effective Date of the Agreement. CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility owners for capital costs related thereto such as plant investment fees.

5.11 Laws and Regulations

5.11.1 CONTRACTOR to Comply

CONTRACTOR shall give all notices and comply with all Laws and Regulations applicable to furnishing and performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither OWNER nor ENGINEER shall be responsible for monitoring CONTRACTOR'S compliance with any Laws and Regulations.

5.11.2 Specifications and Drawings at Variance

If CONTRACTOR observes that the Specifications or Drawings are at variance with any Laws or Regulations, CONTRACTOR shall give ENGINEER prompt written notice thereof, and any necessary changes will be authorized by one of the methods indicated in paragraph 3.4. If CONTRACTOR performs any Work knowing or having reason to know that it is contrary to such Laws, or Regulations, and without such notice to ENGINEER, CONTRACTOR shall bear all costs arising there from; however, it shall not be CONTRACTOR'S primary responsibility to make certain that the Specifications and Drawings are in accordance with such Laws and Regulations.

Any party, firm or individual submitting a proposal pursuant to invitation must have paid all taxes owed to the Lexington-Fayette Urban County Government at the time the proposal is submitted, and must maintain a "current" status in regard to those taxes throughout the Contract. If applicable, business must be licensed in Fayette County.

5.12 Taxes

CONTRACTOR shall pay all sales, consumer, use and other similar taxes required to be paid by CONTRACTOR in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work. Any party, firm or individual submitting a proposal pursuant to invitation must have paid all taxes owed to the Lexington-Fayette Urban County Government at the time the

proposal is submitted, and must maintain a "current" status in regard to those taxes throughout the Contract. If applicable, business must be licensed in Fayette County.

5.13 Use of Premises

5.13.1 Project Site

CONTRACTOR shall confine construction equipment, the storage of materials and equipment and the operations of workers to the staging areas or work site areas identified in and permitted by the Contract Documents and other land and areas permitted by Laws and Regulations, rights-of-way, permits and easements, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any land or areas contiguous thereto, resulting from the performance of the Work. Should any claim be made against OWNER or ENGINEER by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly attempt to settle with such other party by agreement or otherwise resolve the claim by arbitration or at law. CONTRACTOR shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold OWNER and ENGINEER harmless from and against all claims, damages, losses and expenses (including, but not limited to, fees of engineers, architects, attorneys and other professionals and court and arbitration costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any such other party against OWNER or ENGINEER to the extent based on a claim arising out of CONTRACTOR'S performance of the Work.

5.13.2 Clean Up

During the progress of the Work, CONTRACTOR shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work, CONTRACTOR shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery, and surplus materials, and shall leave the site clean and ready for occupancy by OWNER. CONTRACTOR shall restore to original condition all property not designated for alteration by the Contract Documents.

5.13.3 Loading of Structures

CONTRACTOR shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall CONTRACTOR subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

5.14 Record Drawings

CONTRACTOR shall maintain in a safe place at the site one record copy of all Drawings, Specifications, Addenda, Change Orders, Field Orders and written interpretations and clarifications (issued pursuant to paragraph 9.4) in good order and annotated to show all changes made during construction. These record documents together with all approved samples and a counterpart of all approved Shop Drawings will be available to ENGINEER for reference. Upon completion of the Work, these record documents, samples and Shop Drawings will be delivered to ENGINEER for OWNER.

5.15 Shop Drawings and Samples

5.15.1 Shop Drawing Submittals

After checking and verifying all field measurements and after complying with applicable procedures specified, CONTRACTOR shall submit to ENGINEER for review and approval in accordance with the accepted schedule of Shop Drawing submissions (see paragraph 2.8), or for other appropriate action if so indicated in the Special Conditions, five copies (unless otherwise specified) of all Shop Drawings, which will bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR'S responsibilities under the Contract Documents with respect to the review of the submission. All submissions will be identified as ENGINEER may require. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to enable ENGINEER to review the information as required.

5.15.2 Sample Submittals

CONTRACTOR shall also submit to ENGINEER for review and approval with such promptness as to cause no delay in Work, all samples required by the Contract Documents. All samples will have been checked by and accompanied by a specific written indication that CONTRACTOR has satisfied CONTRACTOR'S responsibilities under the Contract Documents with respect to the review of the submission and will be identified clearly as to material, Supplier, pertinent data such as catalog numbers and the use for which intended.

5.15.3 Review by CONTRACTOR

Before submission of each Shop Drawing or sample CONTRACTOR shall have determined and verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar data with respect thereto and reviewed or coordinated each Shop Drawing or sample with other Shop Drawings and samples and with the requirements of the Work and the Contract Documents.

5.15.4 Notice of Variation

At the time of each submission, CONTRACTOR shall give ENGINEER specific written notice of each variation that the Shop Drawings or samples may have from the requirements of the Contract Documents, and, in addition, shall cause a specific notation to be made on each Shop Drawing submitted to ENGINEER for review and approval of each such variation.

5.15.5 ENGINEER'S Approval

ENGINEER will review and approve with reasonable promptness Shop Drawings and samples, but ENGINEER'S review and approval will be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents and shall not extend to means, methods, techniques, sequences or procedures of construction (except where a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions. CONTRACTOR shall make corrections required by ENGINEER, and shall return the required number of corrected copies of Shop Drawings and submit, as required, new samples for review and approval. CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by ENGINEER on previous submittals.

5.15.6 Responsibility for Errors and Omissions

ENGINEER'S review and approval of Shop Drawings or samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless CONTRACTOR has in writing called ENGINEER'S attention to each such variation at the time of submission as required by paragraph 5.15.4 and ENGINEER has given written approval of each such variation by a specific written notation thereof incorporated in or accompanying the Shop Drawing or sample approval; nor will any approval by ENGINEER relieve CONTRACTOR from responsibility for errors or omissions in the Shop Drawings or from responsibility for having complied with the provisions of paragraph 5.15.3.

5.15.7 Cost of Related Work

Where a Shop Drawing or sample is required by the Specifications, any related Work performed prior to ENGINEER'S review and approval of the pertinent submission will be the sole expense and responsibility of CONTRACTOR.

5.16 Continuing the Work

CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolutions of any disputes or disagreements, except as permitted by paragraph 14.5 or as CONTRACTOR and OWNER may otherwise agree in writing.

5.17 Erosion and Sediment Control

5.17.1 General Environmental Requirements

The CONTRACTOR and Subcontractors performing work on projects on behalf of the OWNER shall comply with all applicable federal, state, and local environmental regulations and all requirements and conditions set forth in "special" permits including but not limited to Corp of Engineers 404 permits, 401 Water Quality Certifications, Stream Crossing and Floodplain Encroachment Permits.

Any fines or penalties resulting from the failure to comply with the terms of the federal, state or local permits or perform necessary corrective action are solely the obligation of the CONTRACTOR.

5.17.2 Stormwater Pollution Prevention

A. The CONTRACTOR shall exercise due care to prevent or minimize any damage to any stream or wetland from pollution by debris, sediment or other material. The operation of equipment and/or materials in a jurisdictional wetland is expressly prohibited. Water that has been used for washing or processing, or that contains oils, sediments or other pollutants shall not be discharged from the job site. Such waters shall be collected and properly disposed of by the CONTRACTOR in accordance with applicable local, state and federal law.

B. The CONTRACTOR is solely responsible for securing all required state and local permits associated with stormwater discharges from the project including, but not necessarily limited to the KY Notice of Intent to Disturb (NOI) for Coverage of Storm Water Discharges Associated with Construction Activities under the KPDES Storm Water General Permit KYR100000 and the LFUCG, Land Disturbance Permit. Permit application preparation and all required documentation are the responsibility of the CONTRACTOR. The CONTRACTOR is solely responsible for maintaining compliance with the stormwater pollution

prevention plan or erosion and sediment control plan and ensuring the following:

a. That the Stormwater Pollution Prevention Plan (SWPPP) or erosion control plan is current and available for review on site;
b. That any and all stormwater inspection reports required by the permit are conducted by qualified personnel and are available for review onsite; and
c. That all best management practices (BMPs) are adequately maintained and effective at controlling erosion and preventing sediment from leaving the site.

C. The CONTRACTOR shall provide the necessary equipment and personnel to perform any and all emergency measures that may be required to contain any spillage or leakage and to remove materials, soils or liquids that become contaminated. The collected spill material shall be properly disposed at the Contractor's expense.

D. Upon completion of the work and with the concurrence of the OWNER, the CONTRACTOR must file a Notice of Termination (NOT) of Coverage Under the KPDES General Permit for Storm Water Discharges Associated with Construction Activity with the appropriate local and state authorities.

E. Any fines or penalties resulting from the failure to comply with the terms of the state or local stormwater permits or perform necessary corrective action are solely the obligation of the CONTRACTOR.

6. OTHER WORK

6.1 Related Work at Site

OWNER may perform other work related to the Project at the site by OWNER'S own forces, have other work performed by utility owners or let other direct contracts therefore which shall contain General Conditions similar to these. If the fact that such other work is to be performed was not noted in the Contract Documents, written notice thereof will be given to CONTRACTOR prior to starting any such other work; and, if such performance will involve additional expense to CONTRACTOR or requires additional time, a Change Order to the Contract will be negotiated.

6.2 Other Contractors or Utility Owners

CONTRACTOR shall afford each utility owner and other contractor who is a party to such a direct contract (or OWNER, if OWNER is performing the additional work with OWNER'S employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such work, and shall properly connect and coordinate the Work with theirs. CONTRACTOR shall do all cutting, fitting and patching of the Work that

may be required to make its several parts come together properly and integrate with such other work. CONTRACTOR shall not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of ENGINEER and the others whose work will be affected. The duties and responsibilities of CONTRACTOR under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of CONTRACTOR in said direct contracts between OWNER and such utility owners and other contractors.

6.3 Delays Caused by Others

If any part of CONTRACTOR'S Work depends for proper execution or results upon the work of any such other contractor or utility owner (or OWNER), CONTRACTOR shall inspect and promptly report to ENGINEER in writing any delays, defects or deficiencies in such work that render it unavailable or unsuitable for such proper execution and results. CONTRACTOR'S failure so to report will constitute an acceptance of the other work as fit and proper for integration with CONTRACTOR'S Work except for latent or non-apparent defects and deficiencies in the other work.

6.4 Coordination

If OWNER contracts with others for the performance of other work on the Project at the site, the person or organization who will have authority and responsibility for coordination of the activities among the various prime contractors will be identified in the Special Conditions, and the specific matters to be covered by such authority and responsibility will be itemized, and the extent of such authority and responsibilities will be provided, in the Special Conditions.

7. OWNER'S RESPONSIBILITIES

7.1 Communications

OWNER shall issue all communications to CONTRACTOR through ENGINEER.

7.2 Data and Payments

OWNER shall furnish the data required of OWNER under the Contract Documents promptly after they are due.

7.3 Lands, Easements, and Surveys

OWNER'S duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.1 and 4.4. Paragraph 4.2 refers to OWNER'S identifying and making available to CONTRACTOR copies of reports of explorations and tests of subsurface conditions at the site and in existing structures which have been utilized by ENGINEER in preparing the Drawings and Specifications.

7.4 Change Orders

OWNER is obligated to execute Change Orders as indicated in paragraph 9.4.

7.5 Inspections, Tests and Approvals

OWNER'S responsibility in respect to certain inspections, tests and approvals is set forth in paragraph 13.3.

7.6 Stop or Suspend Work

In connection with OWNER'S right to stop Work or suspend Work, see paragraph 12.4 and 14.1 Paragraph 14.2 deals with OWNER'S rights to terminate services of CONTRACTOR under certain circumstances.

8. ENGINEER'S STATUS DURING CONSTRUCTION

8.1 OWNER'S Representative

ENGINEER will be OWNER'S representative during the construction period. The duties and responsibilities and the limitations of authority of ENGINEER as OWNER'S representative during construction are set forth in the Contract Documents and shall not be extended without written consent of OWNER and ENGINEER.

8.2 Visits to Site

ENGINEER will make visits to the site at intervals appropriate to the various stages of construction to observe the progress and quality of the executed Work and to determine, in general, if the Work is proceeding in accordance with the Contract Documents. ENGINEER will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. ENGINEER'S efforts will be directed toward providing for OWNER a greater degree of confidence that the completed Work will conform to the Contract Documents. On the basis of such visits and on-site observations, ENGINEER will keep OWNER informed of the progress of the Work and will endeavor to guard OWNER against defects and deficiencies in the Work.

8.3 Project Representation

ENGINEER will provide an Inspector to assist ENGINEER in observing the performance of the Work. If OWNER designates another agent to represent OWNER at the site who is not ENGINEER'S agent or employee, the duties, responsibilities and limitations of authority of such other person will be as provided in the Special Conditions.

8.4 Clarifications and Interpretations

ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents (in the form of Drawings or otherwise) as ENGINEER may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents.

8.5 Authorized Variations in Work

ENGINEER may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Time and are consistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order.

8.6 Rejecting Defective Work

ENGINEER will have authority to disapprove or reject Work which ENGINEER believes to be defective, and will also have authority to require special inspection or testing of the Work as provided in paragraph 12.3, whether or not the Work is fabricated, installed or completed.

8.7 Shop Drawings

In connection with ENGINEER'S responsibility for Shop Drawings and samples, see paragraphs 5.15.1 through 5.16 inclusive.

8.8 Change Orders

In connection with ENGINEER'S responsibilities as to Change Orders, see Articles 10, 11 and 12.

8.9 Payments

In connection with ENGINEER'S responsibilities with respect to Applications for Payment, etc., see Article 13.

8.10 Determinations for Unit Prices

ENGINEER will determine the actual quantities and classifications of Unit Price Work performed by CONTRACTOR.

ENGINEER will review with CONTRACTOR ENGINEER'S preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise).

8.11 Decision on Disputes

ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and other matters relating to the acceptability of the Work or the interpretation of the requirements of the Contract Documents pertaining to the performance and furnishing of the Work and claims under Articles 10 and 11 in respect of changes in the Contract Price or Contract Time will be referred initially to ENGINEER in writing with a request for a formal decision in accordance with this paragraph, which ENGINEER will render in writing within a reasonable time. Written notice of each such claim, dispute and other matter will be delivered to ENGINEER promptly (but in no event later than thirty days) after the occurrence of the event giving rise thereto, and written supporting data will be submitted to ENGINEER within sixty days after such occurrence unless ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim.

8.12 Limitations on Engineer's Responsibilities

8.12.1 CONTRACTOR, Supplier, or Surety

Neither ENGINEERS authority to act under this Article 8 or elsewhere in the Contract Documents nor any decision made by ENGINEER in good faith either to exercise or not exercise such authority shall give rise to any duty or responsibility of ENGINEER to CONTRACTOR, any Subcontractor, any Supplier, or any other person or organization performing any of the Work, or to any surety for any of them.

8.12.2 To Evaluate the Work

Whenever in the Contract Documents the terms "as ordered", "as directed", "as required", "as allowed", "as approved" or terms of like effect or import are used, or the adjectives "reasonable", "suitable", "acceptable", "proper", or "satisfactory" or adjectives or like "effect" or "import" are used to describe a requirement, direction, review or judgment of ENGINEER as to the Work, it is intended that such requirement, direction, review or judgment will be solely to evaluate the Work for compliance with the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign ENGINEER any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 8.12.3 or 8.12.4.

8.12.3 CONTRACTOR'S Means, Methods, Etc.

ENGINEER will not be responsible for CONTRACTOR'S means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, and ENGINEER will not be responsible for CONTRACTOR'S failure to perform or furnish the Work in accordance with the Contract Documents.

8.12.4 Acts of Omissions of CONTRACTOR

ENGINEER will not be responsible for the acts or omissions of CONTRACTOR or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work.

9. CHANGES IN THE WORK

9.1 OWNER May Order Change

Without invalidating the Agreement and without notice to any surety, OWNER may, at any time or from time to time, order additions, deletions or revisions in the Work; these will be authorized by a Change Order. Upon receipt of such notice, CONTRACTOR shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

9.2 Claims

Claims for an increase or decrease in the Contract Price or an extension or shortening or the Contract Time that should be allowed as a result of a Change Order will be settled as provided for in Article 10 or Article 11.

9.3 Work Not in Contract Documents

CONTRACTOR shall not be entitled to an increase in the Contract Price or an extension of the Contract Time with respect to any Work performed that is not required by the Contract Documents as amended, modified and supplemented as provided in paragraph 3.4, except in the case of an emergency and except in the case of uncovering Work as provided in paragraph 12.3.4.

9.4 Change Orders

OWNER and CONTRACTOR shall execute appropriate Change Orders covering:

9.4.1 changes in the Work which are ordered by OWNER pursuant to paragraph 9.1, are required because of acceptance of defective Work under paragraph 12.7 or corrective defective Work under paragraph 12.8, or are agreed to by the parties;

9.4.2 changes in the Contract Price or Contract Time which are agreed to by the parties; and

9.4.3 changes in the Contract Price or Contract Time which embody the substance of any written decision rendered by ENGINEER pursuant to paragraph 8.11; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and REGULATIONS, but during any such appeal, CONTRACTOR shall carry on the Work and adhere to the progress schedule as provided in paragraph 5.16.

9.5 Notice of Change

If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Time) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be CONTRACTOR'S responsibility, and the amount of each applicable Bond will be adjusted accordingly.

10. CHANGE OF CONTRACT PRICE

10.1 Total Compensation

The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to CONTRACTOR for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by CONTRACTOR shall be at his expense without change in the Contract Price.

10.2 Claim for Increase or Decrease in Price

The Contract Price may only be changed by a Change Order. Any claim for an increase or decrease in the Contract Price shall be based on written notice delivered by the CONTRACTOR to the ENGINEER promptly (but in no event later than thirty days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the amount of the claim with supporting data shall be delivered within sixty days after such occurrence (unless ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by CONTRACTOR'S written statement that the amount claimed covers all known amounts (direct, indirect, and consequential) to which the CONTRACTOR is entitled as a result of the occurrence of said event.

10.3 Value of Work

The value of any Work covered by a Change Order or of any claim for an increase or decrease in the Contract Price shall be determined in one of the following ways:

10.3.1 Unit Prices

Where the Work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved (subject to the provisions of paragraphs 10.9.1. through 10.9.3, inclusive).

10.3.2 Lump Sum

By mutual acceptance of a lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 10.6.2.1).

10.3.3 Cost Plus Fee

On the basis of the Cost of the Work (determined as provided in paragraphs 10.4 and 10.5) plus a CONTRACTOR'S fee for overhead and profit (determined as provided in paragraphs 10.6 and 10.7).

10.4 Cost of the Work

The term Cost of the Work means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. Except as otherwise may be agreed to in writing by OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project; shall include only the following items; and shall not include any of the costs itemized in paragraph 10.5:

10.4.1 Payroll Costs

Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the Work under schedules of job classifications agreed upon by OWNER and CONTRACTOR. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, workers' or

workmen's compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. Such employees shall include superintendents and foremen at the site. The expenses of performing Work after regular working hours, on Saturday, Sunday or legal holidays, shall be included in the above to the extent authorized by OWNER.

10.4.2 Materials and Equipment Costs

Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to CONTRACTOR unless OWNER deposits funds with CONTRACTOR with which to make payments, in which case the cash discounts shall accrue to OWNER. All trade discounts, rebates and refunds and all returns from sale of surplus materials and equipment shall accrue to OWNER, and CONTRACTOR shall make provisions so that they may be obtained.

10.4.3 Subcontractor Costs

Payments made by CONTRACTOR to the Subcontractors for Work performed by Subcontractors. If required by OWNER, CONTRACTOR shall obtain competitive bids from Subcontractors acceptable to CONTRACTOR and shall deliver such bids to OWNER who will then determine, with the advice of ENGINEER, which bids will be accepted. If a subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work Plus a Fee, the Subcontractor's Cost of the Work shall be determined in the same manner as CONTRACTOR'S Cost of the Work. All subcontracts shall be subject to the other provisions of the Contract Documents insofar as applicable.

10.4.4 Special Consultant Costs

Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys and accountants) employed for services specifically related to the Work.

10.4.5 Supplemental Costs

10.4.5.1 The proportion of necessary transportation, travel and subsistence expenses of CONTRACTOR'S employees incurred in discharge of duties connected with the Work.

10.4.5.2 Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the site and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost less market value of such items used but

not consumed which remain the property of CONTRACTOR.

10.4.5.3 Rentals of all construction equipment and machinery and the parts thereof whether rented from CONTRACTOR or others in accordance with rental agreements approved by OWNER with the advice of ENGINEER, and the costs of transportation, loading, unloading, installation, dismantling and removal shall be in accordance with terms of said rental agreements. The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the Work.

10.4.5.4 Sales, consumer, use or similar taxes related to the Work, and for which CONTRACTOR is liable, imposed by Laws and Regulations.

10.4.5.5 Deposits lost for causes other than negligence of CONTRACTOR, any Subcontractor or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

10.4.5.6 Losses and damages (and related expenses), not compensated by insurance or otherwise, to the Work or otherwise sustained by CONTRACTOR in connection with the performance and furnishing of the Work (except losses and damages within the deductible amounts of property insurance established by OWNER), provided they have resulted from causes other than the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of OWNER. No such losses, damages and expenses shall be included in the Cost of the Work for the purpose of determining CONTRACTOR'S fee. If, however, any such loss or damage requires reconstruction and CONTRACTOR is placed in charge thereof, CONTRACTOR shall be paid a fee proportionate to that stated in paragraph 10.6.2 for services.

10.4.5.7 The cost of utilities, fuel and sanitary facilities at the site.

10.4.5.8 Minor expenses such as telegrams, long distance telephone calls, telephone service at the site, expressage and similar petty cash items in connection with the Work.

10.4.5.9 Cost of premiums for additional Bonds and insurance required because of changes in the Work and premiums for property insurance coverage within the limits of the deductible amounts established by OWNER.

10.5 Not to Be Included in Cost of the Work

The term Cost of the Work shall not include any of the following:

10.5.1 Costs of Officers and Executives

Payroll costs and other compensation of CONTRACTOR'S officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks and other personnel employed by CONTRACTOR whether at the site or in CONTRACTOR'S principal or a branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 10.4.1 or specifically covered by paragraph 10.4.4 - all of which are to be considered administrative costs covered by the CONTRACTOR'S fee.

10.5.2 Principal Office

Expenses of CONTRACTOR'S principal and branch offices other than CONTRACTOR'S office at the site.

10.5.3 Capital Expense

Any part of CONTRACTOR'S capital expenses, including interest on CONTRACTOR'S capital employed for the Work and charges against CONTRACTOR for delinquent payments.

10.5.4 Bonds and Insurance

Cost of premiums for all Bonds and for all insurance whether or not CONTRACTOR is required by the Contract Documents to purchase and maintain the same (except for the cost of premiums covered by subparagraph 10.4.5.9 above).

10.5.5 Costs Due to Negligence

Costs due to the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied and making good any damage to property.

10.5.6 Other Costs

Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraph 10.4.

10.6 Contractor's Fee

The CONTRACTOR'S Fee allowed to CONTRACTOR for overhead and profit shall be determined as follows:

10.6.1 a mutually acceptable fixed fee; or if none can be agreed upon,

10.6.2 a fee based on the following percentages of the various portions of the Cost of the Work:

10.6.2.1 for costs incurred under paragraphs 10.4.1 and 10.4.2, the CONTRACTOR'S fee shall be fifteen percent;

10.6.2.2 for costs incurred under paragraph 10.4.3, the CONTRACTOR'S fee shall be five percent; and if a subcontract is on the basis of Cost of the Work Plus a fee, the maximum allowable to CONTRACTOR on account of overhead and profit of all Subcontractors shall be fifteen percent;

10.6.2.3 no fee shall be payable on the basis of costs itemized under paragraphs 10.4.4, 10.4.5 and 10.5;

10.6.2.4 the amount of credit to be allowed by CONTRACTOR to OWNER for any such change which results in a net decrease in cost will be the amount of the actual net decrease plus a deduction in CONTRACTOR'S Fee by an amount equal to ten percent of the net decrease; and

10.6.2.5 when both additions and credits are involved in any one change, the adjustment in CONTRACTOR'S fee shall be computed on the basis of the net change in accordance with paragraphs 10.6.2.1 through 10.6.2.4, inclusive.

10.7 Itemized Cost Breakdown

Whenever the cost of any Work is to be determined pursuant to paragraph 10.4 or 10.5, CONTRACTOR will submit in form acceptable to ENGINEER an itemized cost breakdown together with supporting data.

10.8 Cash Allowances

It is understood that CONTRACTOR has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be done by such Subcontractors or Suppliers and for such sums within the limit of the allowances as may be acceptable to ENGINEER, CONTRACTOR agrees that:

10.8.1 Materials and Equipment

The allowances include the cost to CONTRACTOR (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the site, and all applicable taxes; and

10.8.2 Other Costs

CONTRACTOR'S costs for unloading and handling on the site, labor, installation costs, overhead, profit and other expenses contemplated for the allowances have been included in the Contract Price and not in the allowances. No demand for additional payment on account of any thereof will be valid.

10.8.3 Change Order

Prior to final payment, an appropriate Change Order will be issued as recommended by ENGINEER to reflect actual amounts due CONTRACTOR on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

10.9 Unit Price Work

10.9.1 General

Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit prices for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by ENGINEER in accordance with Paragraph 8.10.

10.9.2 Overhead and Profit

Each unit price will be deemed to include an amount considered by CONTRACTOR to be adequate to cover CONTRACTOR'S overhead and profit for each separately identified item.

10.9.3 Claim for Increase in Unit Price

Where the quantity of any item of Unit Price Work performed by CONTRACTOR differs materially and significantly from the estimated quantity of such item indicated in the Agreement and there is no corresponding adjustment with respect to any other item of Work and if CONTRACTOR believes that CONTRACTOR has incurred additional expense as a result thereof, CONTRACTOR may make a claim for an increase in the Contract Price in accordance with Article 10.

11. CHANGE OF CONTRACT TIME

11.1 Change Order

The Contract Time may only be changed by a Change Order. Any claim for an extension or shortening of the Contract Time shall be based on written notice delivered to ENGINEER promptly (but in no event later than thirty days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the extent of the claim with supporting data shall be delivered within sixty days after such occurrence (unless ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Time shall be determined by ENGINEER in accordance with paragraph 8.11. No claim for an adjustment in the Contract Time will be valid if not submitted in accordance with the requirements of this paragraph 11.1.

11.2 Justification for Time Extensions

The Contract Time will be extended in an amount equal to time lost due to delays beyond the control of CONTRACTOR if a claim is made therefore as provided in paragraph 11.1. Such delays shall include, but not be limited to, acts or neglect by OWNER or others performing additional work as contemplated by Article 6, or to fires, floods, labor disputes, epidemics, abnormal weather conditions or acts of God.

11.3 Time Limits

All time limits stated in the Contract Documents are of the essence of the Agreement. The provisions of this Article 11 shall not exclude recovery for damages (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court costs) for delay by either party.

12. WARRANTY AND GUARANTEE; TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

12.1 Warranty and Guarantee

CONTRACTOR warrants and guarantees to OWNER and ENGINEER that all Work will be in accordance with the Contract Documents and will not be defective. All defective Work, whether or not in place, may be rejected, corrected or accepted as provided in this Article 12.

12.2 Access to Work

ENGINEER and ENGINEER'S representatives, other representatives of OWNER, testing agencies and governmental agencies with jurisdictional interests will have access to the Work at reasonable times for their observation, inspecting and testing. CONTRACTOR shall provide proper and safe conditions for such access.

12.3 Tests and Inspections

12.3.1 Timely Notice

CONTRACTOR shall give ENGINEER timely notice of readiness of the Work for all required inspections, tests or approvals.

12.3.2 Requirements and Responsibilities

The ENGINEER may require such inspection and testing during the course of the Work as he/she deems necessary to ascertain and assure the integrity and acceptable quality of the materials incorporated and the work performed. Inspection presence may be either full-time or intermittent, and neither the presence nor absence at any time of the ENGINEER or the INSPECTOR shall relieve the CONTRACTOR of sole responsibility for the acceptability and integrity of the Work or any part thereof.

The costs of sampling, testing, and inspection on-site to ascertain acceptability of the Work and materials will be borne by the OWNER except as otherwise provided. The OWNER will select a testing laboratory to perform such sampling and testing. Sampling and/or testing required by the CONTRACTOR or necessitated by failure of Work or materials to meet the above acceptability test shall be at the expense of the CONTRACTOR.

Inspection services may be performed by the employees of the OWNER or by others selected or designated by the OWNER or the ENGINEER.

Sampling and/or testing required for manufacturing quality and/or process control, for certification that raw mineral materials or manufactured products are the quality specified in the contract, or to assure the acceptability for incorporation into the Work shall be borne by the CONTRACTOR or the material supplier.

Cost for inspection, sampling, testing, and approvals required by the laws or regulations of any public body having competent jurisdiction shall be borne by the CONTRACTOR or the material supplier.

Sampling and testing will be in accord with pertinent codes and regulations and with appropriate standards of the American Society of Testing Materials or other specified standards.

12.3.3 On-site Construction Test and Other Testing

All inspections, tests or approvals other than those required by Laws or Regulations of any public body having jurisdiction shall be performed by organizations acceptable to OWNER and CONTRACTOR (or by ENGINEER if so specified).

12.3.4 Covered Work

If any Work (including the work of others) that is to be inspected, tested or approved is covered without written concurrence of ENGINEER, it must, if requested by ENGINEER, be uncovered for observation. Such uncovering shall be at CONTRACTOR'S expense unless CONTRACTOR has given ENGINEER timely notice of CONTRACTOR'S intention to cover the same and ENGINEER has not acted with reasonable promptness in response to such notice.

12.3.5 CONTRACTOR'S Obligation

Neither observations by ENGINEER nor inspections, tests or approvals by others shall relieve CONTRACTOR from CONTRACTOR'S obligations to perform the Work in accordance with the Contract Documents.

12.4 OWNER May Stop the Work

If the Work is defective, or CONTRACTOR fails to supply sufficient skilled workers or suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, OWNER may order CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of OWNER to stop the Work shall not give rise to any duty on the part of OWNER to exercise this right for the benefit of CONTRACTOR or any other party.

12.5 Correction or Removal of Defective Work

If required by ENGINEER, CONTRACTOR shall promptly, as directed, either correct all defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by ENGINEER, remove it from the site and replace it with non-defective Work. CONTRACTOR shall bear all direct, indirect and consequential costs of such correction or removal (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) made necessary thereby.

12.6 One Year Correction Period

If within one year after the date of Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER'S written instructions, either correct such defective Work, or, if it has been rejected by OWNER, remove it from the site and replace it with non-defective Work. If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the defective Work corrected or the rejected Work removed and replaced, and all direct, indirect and consequential costs of such removal and replacement (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) will be paid by CONTRACTOR. In special circumstances

where a particular item of equipment is placed in continuous service before Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications or by Change Order.

12.7 Acceptance of Defective Work

If, instead of requiring correction or removal and replacement of defective Work, OWNER prefers to accept it, OWNER may do so. CONTRACTOR shall bear all direct, indirect and consequential costs attributable to OWNER'S evaluation of and determination to accept such defective Work (such costs to be approved by ENGINEER as to reasonableness and to include but not be limited to fees and charges of engineers, architects, attorneys and other professionals).

12.8 OWNER May Correct Defective Work

If CONTRACTOR fails within a reasonable time after written notice of ENGINEER to proceed to correct and to correct defective Work or to remove and replace rejected Work as required by ENGINEER in accordance with paragraph 12.5, or if CONTRACTOR fails to perform the Work in accordance with the Contract Documents, or if CONTRACTOR fails to comply with any other provision of the Contract Documents, OWNER may, after seven days' written notice to CONTRACTOR, correct and remedy any such deficiency. In exercising the rights and remedies under this paragraph OWNER shall proceed expeditiously. To the extent necessary to complete corrective and remedial action, OWNER may exclude CONTRACTOR from all or part of the site, take possession of all or part of the Work, and suspend CONTRACTOR'S services related thereto, take possession of CONTRACTOR'S tools, appliances, construction equipment and machinery at the site and incorporate in the Work all materials and equipment stored at the site or for which OWNER has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow OWNER, OWNER'S representatives, agents and employees such access to the site as may be necessary to enable OWNER to exercise the rights and remedies under this paragraph. All direct, indirect and consequential costs of OWNER in exercising such rights and remedies will be charged against CONTRACTOR in an amount approved as to reasonableness by ENGINEER, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price. Such direct, indirect and consequential costs will include but not be limited to fees and charges of engineers, architects, attorneys and other professionals, all court costs and all costs of repair and replacement of work of others destroyed or damaged by correction, removal or replacement of CONTRACTOR'S defective Work. CONTRACTOR shall not be allowed an extension of the Contract Time because of any delay in performance of the Work attributable to the exercise by OWNER of OWNER'S rights and remedies hereunder.

13. PAYMENTS TO CONTRACTOR AND COMPLETION

13.1 Schedule of Values

The schedule of values established as provided in paragraph 2.8 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to ENGINEER. Progress payments on account of Unit Price Work will be based on the number of units completed.

13.2 Application for Progress Payment

At least ten days before each progress payment is scheduled (but not more often than once a month), CONTRACTOR shall submit to ENGINEER for review an Application for Payment filled out and signed by CONTRACTOR covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice or other documentation warranting that OWNER has received the materials and equipment free and clear of all liens, charges, security interests and encumbrances (which are hereinafter in these General Conditions referred to as "Liens") and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect OWNER'S interest therein, all of which will be satisfactory to OWNER. OWNER shall, within thirty (30) calendar days of presentation to him of an approved Application for Payment, pay CONTRACTOR the amount approved by ENGINEER.

13.3 CONTRACTOR'S Warranty of Title

CONTRACTOR warrants and guarantees that title to all Work, materials and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to OWNER no later than the time of payment free and clear of all Liens.

13.4 Review of Applications for Progress Payment

13.4.1 Submission of Application for Payment

ENGINEER will, after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to OWNER, or return the Application to CONTRACTOR indicating in writing ENGINEER'S reasons for refusing to recommend payment. In the latter case, CONTRACTOR may make the necessary corrections and resubmit the Application.

13.4.2 ENGINEER'S Recommendation

ENGINEER may refuse to recommend the whole or any part of any payment, if, in ENGINEER'S opinion, it would be incorrect to make such representations to OWNER. ENGINEER may also refuse to recommend any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously recommended, to such extent as may be necessary in ENGINEER'S opinion to protect OWNER from loss because:

13.4.2.1 the Work is defective, or completed Work has been damaged requiring correction or replacement;

13.4.2.2 the Contract Price has been reduced by Written Amendment or Change Order;

13.4.2.3 OWNER has been required to correct defective Work or complete Work in accordance with paragraph 12.8; or

13.4.2.4 of ENGINEER'S actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.2.1 through 14.2.9 inclusive.

13.5 Partial Utilization

OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and has been completed. If CONTRACTOR agrees, CONTRACTOR will certify to OWNER that said part of the Work is complete and request that a Certificate of Completion be issued for that part of the Work.

13.6 Final Inspection

Upon written notice from CONTRACTOR that the entire Work or an agreed portion thereof is complete, ENGINEER will make a final inspection with CONTRACTOR and will notify CONTRACTOR in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. CONTRACTOR shall immediately take such measures as are necessary to remedy such deficiencies.

13.7 Final Application for Payment

After CONTRACTOR has completed all such corrections to the satisfaction of ENGINEER and delivered all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, marked-up record documents (as provided in paragraph 5.14) and other documents - all as required by the Contract Documents, and after ENGINEER has indicated that the Work is acceptable (subject to the provisions of paragraph 13.10), CONTRACTOR may make application for final payment following the procedure for progress payments. The final Application

for Payment shall be accompanied by all documentation called for in the Contract Documents, together with complete and legally effective releases or waivers (satisfactory to OWNER) of all Liens arising out of or filed in connection with the Work. In lieu thereof and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full; an affidavit of CONTRACTOR that the releases and receipts include all labor, services, material and equipment for which a Lien could be filed, and that all payrolls, material and equipment bills, and other indebtedness connected with the Work for which OWNER or OWNER'S property might in any way be responsible, have been paid or otherwise satisfied; and consent of the surety, if any, to final payment. If any Subcontractor or Supplier fails to furnish a release or receipt in full, CONTRACTOR may furnish a Bond or other collateral satisfactory to OWNER to indemnify OWNER against any Lien.

13.8 Final Payment and Acceptance

13.8.1 ENGINEER'S Approval

If, on the basis of ENGINEER'S observation of the Work during construction and final inspection, and ENGINEER'S review of the final Application for Payment and accompanying documentation - all as required by the Contract Documents, ENGINEER is satisfied that the Work has been completed and CONTRACTOR'S other obligations under the Contract Documents have been fulfilled, ENGINEER will, after receipt of the final Application for Payment, indicate in writing ENGINEER'S recommendation of payment and present the Application to OWNER for payment. Thereupon ENGINEER will give written notice to OWNER and CONTRACTOR that the Work is acceptable, subject to the provisions of paragraph 13.10. Otherwise, ENGINEER will return the Application to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case CONTRACTOR shall make the necessary corrections and resubmit the Application.

13.8.2 Delay in Completion of Work

If, through no fault of CONTRACTOR, final completion of the Work is significantly delayed, OWNER shall, upon receipt of CONTRACTOR'S final Application for Payment and recommendation of ENGINEER, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by OWNER for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph 10 of Part II, Information for Bidders, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by CONTRACTOR to ENGINEER with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

13.9 CONTRACTOR'S Continuing Obligation

CONTRACTOR'S obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. Neither recommendation of any progress or final payment by ENGINEER, nor the issuance of a certificate of Completion, nor any payment by OWNER to CONTRACTOR under the Contract Documents, nor any use or occupancy of the Work or any part thereof by OWNER, nor any act of acceptance by OWNER nor any failure to do so, nor any review and approval of a Shop Drawing or sample submission, nor any correction of defective Work by OWNER will constitute an acceptance of Work not in accordance with the Contract Documents or a release of CONTRACTOR'S obligation to perform the Work in accordance with the Contract Documents (except as provided in paragraph 13.10).

13.10 Waiver of Claims

The making and acceptance of final payment will constitute:

13.10.1 a waiver of all claims by OWNER against CONTRACTOR, except claims arising from unsettled Liens, from defective Work appearing after final inspection or from failure to comply with the Contract Documents or the terms of any special guarantees specified therein; however, it will not constitute a waiver by OWNER of any rights in respect of CONTRACTOR'S continuing obligations under the Contract Documents; and

13.10.2 a waiver of all claims by CONTRACTOR against OWNER other than those previously made in writing and still unsettled.

14. SUSPENSION OF WORK AND TERMINATION

14.1 OWNER May Suspend Work

OWNER may, at any time and without cause, suspend the Work or any portion thereof for a period of not more than ninety days by notice in writing to CONTRACTOR and ENGINEER which will fix the date on which Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed. CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension if CONTRACTOR makes an approved claim therefore as provided in Articles 10 and 11.

14.2 OWNER May Terminate

The OWNER may terminate the Work upon the occurrence of any one or more of the following events:

14.2.1 if CONTRACTOR commences a voluntary case under any chapter of the Bankruptcy Code (Title 11, United States Code), as now or hereafter in effect, or if CONTRACTOR takes any equivalent or similar action by filing

a petition or otherwise under any other federal or state law in effect at such time relating to the bankruptcy or insolvency;

14.2.2 if a petition is filed against CONTRACTOR under any chapter of the Bankruptcy Code as now or hereafter in effect at the time of filing, or if a petition is filed seeking any such equivalent or similar relief against CONTRACTOR under any other federal or state law in effect at the time relating to bankruptcy or insolvency;

14.2.3 if CONTRACTOR makes a general assignment for the benefit of creditors;

14.2.4 if a trustee, receiver, custodian or agent of CONTRACTOR is appointed under applicable law or under contract, whose appointment or authority to take charge of property of CONTRACTOR is for the purpose of enforcing a Lien against such property or for the purpose of general administration of such property for the benefit of CONTRACTOR'S creditors;

14.2.5 if CONTRACTOR admits in writing an inability to pay its debts generally as they become due;

14.2.6 if CONTRACTOR persistently fails to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 2.8 as revised from time to time);

14.2.7 if CONTRACTOR disregards Laws or Regulations of any public body having jurisdiction;

14.2.8 if CONTRACTOR disregards the authority of ENGINEER, or

14.2.9 if CONTRACTOR otherwise violates in any substantial way any provisions of the Contract Documents;

OWNER may, after giving CONTRACTOR (and the surety) seven days' written notice and to the extent permitted by Laws and Regulations, terminate the services of CONTRACTOR, exclude CONTRACTOR from the site and take possession of the Work and of all CONTRACTOR'S tools, appliances, construction equipment and machinery at the site and use the same to the full extent they could be used by CONTRACTOR (without liability to CONTRACTOR for trespass or conversion), incorporate in the Work all materials and equipment stored at the site or for which OWNER has paid CONTRACTOR but which are stored elsewhere, and finish the Work as OWNER may deem expedient. In such case CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds the direct, indirect and

consequential costs of completing the Work (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs) such excess will be paid to CONTRACTOR. If such costs exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER. Such costs incurred by OWNER will be approved as to reasonableness by ENGINEER and incorporated in a Change Order, but when exercising any rights or remedies under this paragraph OWNER shall not be required to obtain the lowest price for the Work performed.

14.2.10 If safety violations are observed and brought to the Contractors attention and Contractor fails to take immediate corrective measures any repeat of similar safety violations, Owner will order an immediate termination of contract. Note: it is the Contractor's responsibility to know proper safety measures as they pertain to construction and OSHA.

14.2.11 This contract may be canceled by either party thirty (30) days after delivery by canceling party of written notice of intent to cancel to the other contracting party.

14.2.12 This contract may be canceled by the Lexington-Fayette Urban County Government if it is determined that the Bidder has failed to perform under the terms of this agreement, such cancellation to be effective upon receipt of written notice of cancellation by the Bidder.

14.3 CONTRACTOR'S Services Terminated

Where CONTRACTOR'S services have been so terminated by OWNER, the termination will not affect any rights or remedies of OWNER against CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of moneys due CONTRACTOR by OWNER will not release CONTRACTOR from liability.

14.4 Payment After Termination

Upon seven days' written notice to CONTRACTOR, OWNER may, without cause and without prejudice to any other right or remedy, elect to abandon the Work and terminate the Agreement. In such case, CONTRACTOR shall be paid for all Work executed and any expense sustained plus reasonable termination expenses, which will include, but not be limited to, direct, indirect and consequential costs (including, but not limited to, fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs).

14.5 CONTRACTOR May Stop Work or Terminate

If, through no act or fault of CONTRACTOR, the Work is suspended for a period of more than ninety days by OWNER or under an order of court or other public authority, or ENGINEER fails to act on any Application for Payment within sixty days after it is submitted, or OWNER fails for sixty days to pay CONTRACTOR any sum finally determined to be due, then CONTRACTOR may, upon seven days'

written notice to OWNER and ENGINEER, terminate the Agreement and recover from OWNER payment for all Work executed and any expense sustained plus reasonable termination expenses. In addition and in lieu of terminating the Agreement, if ENGINEER has failed to act on an Application for Payment or OWNER has failed to make any payment as aforesaid, CONTRACTOR may upon seven days' written notice to OWNER and ENGINEER stop the Work until payment of all amounts then due. The provisions of this paragraph shall not relieve CONTRACTOR of the obligations under paragraph 5.16 to carry on the Work in accordance with the progress schedule and without delay during disputes and disagreements with OWNER.

15. MISCELLANEOUS

15.1 Claims for Injury or Damage

Should OWNER or CONTRACTOR suffer injury or damage to person or property because of any error, omission or act of the other party or of any of the other party's employees or agents or others for whose acts the other party is legally liable, claim will be made in writing to the other party within a reasonable time of the first observance of such injury or damage. The provisions of this paragraph 15.1 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or repose.

15.2 Non-Discrimination in Employment

The CONTRACTOR shall comply with the following requirements prohibiting discrimination:

15.2.1 That no person (as defined in KRS 344.010) shall bid on Lexington-Fayette Urban County Government construction projects, or bid to furnish materials or supplies to the Lexington-Fayette Urban County Government, if, within six months prior to the time of opening of bids, said person shall have been found, by declamatory judgment action in Fayette Circuit Court, to be presently engaging in an unlawful practice, as hereinafter defined. Such declamatory judgment action may be brought by an aggrieved individual or upon an allegation that an effort at conciliation pursuant to KRS 344.200 has been attempted and failed, by the Lexington-Fayette County Human Rights Commission.

15.2.2 That it is an unlawful practice for an employer:

15.2.2.1 to fail or refuse to hire, or to discharge any individual or otherwise to discriminate against an individual, with respect to his compensation, terms, conditions, or privileges of employment, because of such individual's race, color, religion, sex, age, or national origin; or

15.2.2.2 to limit, segregate or classify his employees in any way which would deprive or tend to deprive an individual of employment opportunities or otherwise adversely affect his status as an employee because of such individual's sex, race, color, religion, age, or national origin.

15.2.3 That it is an unlawful practice for an employer, labor organization, or joint-labor management committee controlling apprenticeship or other training or retraining, including on-the-job training programs to discriminate against an individual because of his race, color, religion, sex, age, or national origin in admission to, or employment in, any program established to provide apprenticeship or other training.

15.2.4 That a copy of this Ordinance shall be furnished all suppliers and made a part of all bid specifications.

15.2.5 This Ordinance shall take effect after it is signed, published and recorded, as required by law.

15.3 Temporary Street Closing or Blockage

The CONTRACTOR will notify the ENGINEER at least 72 hours prior to making any temporary street closing or blockage. This will permit orderly notification to all concerned public agencies. Specific details and restrictions on street closure or blockage are contained in the Special Conditions.

15.4 Percentage of Work Performed by prime CONTRACTOR

The CONTRACTOR shall perform on site, and with its own organization, Work equivalent to at least fifty (50%) percent of the total amount of Work to be performed under the Contract. This percentage may be reduced by a supplemental agreement to this Contract if, during performing the Work, the CONTRACTOR requests a reduction and the ENGINEER determines that the reduction would be to the advantage of the OWNER.

15.5 Clean-up

Cleanup shall progress, to the greatest degree practicable, throughout the course of the Work. The Work will not be considered as completed, and final payment will not be made, until the right-of-way and all ground occupied or affected by the Contractor in connection with the Work has been cleared of all rubbish, equipment, excess materials, temporary structures, and weeds. Rubbish and all waste materials of whatever nature shall be disposed of, off of the project site, in an acceptable manner. All property, both public and private, which has been damaged in the prosecution of the Work, shall be restored in an acceptable manner. All areas shall be draining, and all drainage ways shall be left unobstructed, and in such a condition that drift will not collect or scour be induced.

15.6 General

The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon CONTRACTOR by paragraphs 12.1, 12.3.5, 13.3, and 15.2 and all of the rights and remedies available to OWNER and ENGINEER thereunder, are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee or by other provisions of the Contract Documents, and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply. All representations, warranties and guarantees made in the Contract Documents will survive final payment and termination or completion of the Agreement.

15.7 Debris Disposal

For all LFUCG projects any trash, construction demolition debris, yard waste, dirt or debris of any kind that is removed from the project site must be disposed of in accordance with local, state, and federal regulations. The disposal site or facility must be approved in advance by the LFUCG and disposal documentation is required. The Contractor will be responsible for payment of any fines associated with improper disposal of material removed from the project site.

END OF SECTION

PART V

SPECIAL CONDITIONS

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1.0 RISK MANAGEMENT PROVISIONS INSURANCE AND INDEMNIFICATION

A. DEFINITIONS

1. The CONTRACTOR understands and agrees that the Risk Management Provisions of this Contract define the responsibilities of the CONTRACTOR to the OWNER.

2. As used in these Risk Management Provisions, the terms "CONTRACTOR" and "OWNER" shall be defined as follows:

   a. "CONTRACTOR" means the contractor and its employees, agents, servants, owners, principals, licensees, assigns and subcontractors of any tier.

   b. "OWNER" means the Lexington-Fayette Urban County Government (LFUCG) and its elected and appointed officials, employees, agents, boards, consultants, assigns, volunteers and successors in interest.

   c. OWNER/ENGINEER's Consultant means Strand Associates, Inc.®

      Strand Associates, Inc.® provided design services for the Project, which included preparation of Contract Documents, and will provide services during construction consisting of: responding to questions of OWNER and ENGINEER about the Contract Documents; preparing change orders as needed; providing shop drawing review; and reviewing CONTRACTOR progress pay requests. Strand Associates, Inc.® shall be provided with the same indemnification by CONTRACTOR as is provided for OWNER in the Contract Documents and shall be listed as an additional insured as is provided for OWNER in the Contract Documents. Excepting those noted above, no other duties or responsibilities shall be construed from the Contract Documents as being the obligation of Strand Associates, Inc.®

B. INDEMNIFICATION AND HOLD HARMLESS PROVISION

1. It is understood and agreed by the parties that Contractor hereby assumes the entire responsibility and liability for any and all damages to persons or property caused by or resulting from or arising out of any act or omission on the part of Contractor under or in connection with this agreement and/or the provision of goods or services and the performance or failure to perform any work required thereby.

2. Contractor shall indemnify, save, hold harmless and defend the Owner from and against all liability, damages, and losses, including but not limited to, demands, claims, obligations, causes of action, judgments, penalties, fines, liens, costs, expenses, interest, defense costs and reasonable attorney's fees that are in any way incidental to or connected with, or that arise or are alleged to have arisen, directly or indirectly, from or by Contractor's performance or breach of the agreement

and/or the provision of goods or services provided that: (a) it is attributable to personal injury, bodily injury, sickness, or death, or to injury to or destruction of property (including the loss of use resulting therefrom), or to or from the negligent acts, errors or omissions or willful misconduct of the Contractor; and (b) not caused solely by the active negligence or willful misconduct of the Owner.

3. In the event the Owner is alleged to be liable based upon the above, Contractor shall defend such allegations and shall bear all costs, fees and expenses of such defense, including but not limited to, all reasonable attorneys' fees and expenses, court costs, and expert witness fees and expenses, using attorneys approved in writing by the Owner, which approval shall not be unreasonably withheld.

4. These provisions shall in no way be limited by any financial responsibility or insurance requirements, and shall survive the termination of this Agreement (Contract).

5. The Work and services performed hereunder involve a Consent Decree as further explained in of Section SC, provision 2.0 of these specifications. The provisions of that provision are incorporated herein by reference as if expressly stated.

6. Owner is a political subdivision of the Commonwealth of Kentucky. Contractor acknowledges and agrees that the Owner is unable to provide indemnity or otherwise save, hold harmless, or defend the Contractor in any manner.

C. FINANCIAL RESPONSIBILITY

The Contractor understands and agrees that it shall, prior to final acceptance of its Bid and the commencement of any Work, demonstrate the ability to assure compliance with the Indemnity Agreement and other provisions of this Agreement (Contract).

D. INSURANCE REQUIREMENTS

Bidders' attention is directed to the following insurance requirements, as Bidders must confer with their respective insurance agents, brokers, or carriers to determine in advance of Bid submission the availability of the insurance coverage's and endorsements required herein. If an apparent low Bidder fails to comply strictly with the insurance requirements below, that Bidder shall be disqualified from the award of the Agreement (Contract), at the Owner's discretion.

1. Required Insurance Coverage

Contractor shall procure and maintain for the duration of this Agreement (Contract) the following or equivalent insurance policies at no less than the limits shown below and cause its subcontractors to maintain similar insurance with limits acceptable to Owner in order to protect Owner against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the Work hereunder by Contractor. The cost of such insurance shall be included in any Bid.

a. General Liability, including Operations Products and Completed Operations

$1,000,000 per occurrence, $2,000,000 aggregate or $2,000,000 combined single limit.

b. Commercial Automobile Liability (Insurance Services Office Form CG 00 01) $1,000,000 combined single limit per occurrence.

c. Workers Compensation Statutory.

d. Employers' Liability $500,000.

e. Builder's Risk - Installation Floater

Completed value of the project with no coinsurance penalty provisions. Coverage includes LFUGG, all contractors and subcontractors involved in the project.

f. Contractors Pollution

$2,000,000 each occurrence - $5,000,000 policy aggregate, including errors and omissions.

g. Umbrella or Excess Liability Policy

$2,000,000

The policies above shall contain the following conditions:

a. All Certificates of Insurance forms used by the insurance carrier shall be properly filed and approved by the Department of Insurance for the Commonwealth of Kentucky (DOI). Owner shall be named as additional insured in the General Liability Policy and Commercial Automobile Liability Policy using the Kentucky DOI approved forms.
b. The General Liability Policy shall be primary to any insurance or self-insurance retained by Owner.
c. The General Liability Policy shall include a Products and Completed Operations endorsement or Premises and Operations Liability endorsement unless it is deemed not to apply by Owner.
d. The General Liability Policy shall include an Explosion-Collapse Underground (XCU) endorsement.
e. The General Liability Policy shall include a Pollution Liability and/or Environmental Casualty endorsement.
f. Owner shall be provided at least thirty (30) days advance written notice via certified mail, return receipt requested, in the event any of the required policies are canceled or non-renewed.

g. Said coverage shall be written by insurers acceptable to Owner and shall be in a form acceptable to Owner. Insurance placed with insurers with a rating classification of no less than Excellent (A or A-) and a financial size category of no less than VIII, as defined by the most current Best's Key Rating Guide shall be deemed automatically acceptable.

h. that the Bidder obtain an Umbrella Liability policy with a limit $2,000,000.00 and that this policy be renewed for one (1) year after.

2. Renewals

After insurance has been approved by Owner, evidence of renewal of an expiring policy must be submitted to Owner, and may be submitted on a manually signed renewal endorsement form. If the policy or carrier has changed, however, new evidence of coverage must be submitted in accordance with these Insurance Requirements.

3. Deductibles and Self-Insured Programs

IF CONTRACTOR INTENDS TO SUBMIT SELF-INSURANCE PLAN. IT MUST BE FORWARDED TO LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT, DIVISION OF RISK MANAGEMENT, 200 EAST MAIN STREET, LEXINGTON, KENTUCKY 40507 NO LATER THAN A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO BID OPENING DATE. Self-insurance programs, deductibles, and self-insured retentions in insurance policies are subject to separate approval by Lexington-Fayette Urban County Government's Division of Risk Management, upon review of evidence of Contractor's financial capacity to respond to claims. Any such programs or retentions must provide Owner with at last the same protection from liability and defense of suits as would be afforded by first-dollar insurance coverage. If Contractor satisfies any portion of the insurance requirements through deductibles, self-insurance programs, or self-insured . retentions, Contractor agrees to provide Lexington-Fayette Urban County Government, Division of Risk Management, the following data prior to the final acceptance of Bid and the commencement of work:

a. Contractor's latest audited financial statement, including auditor's notes.
b. Any records of any self-insured trust fund plan or policy and related accounting statement.
c. Actuarial funding reports or retained losses.
d. Risk Management Manual or a description of self-insurance and risk management program.
e. A claim loss run summary for the previous five (5) years.
f. Self-Insured Associations will be considered.

4. Safety and Loss Control

Contractor shall comply with all applicable federal, state, and local safety standards related to the performance of its works or services under this Agreement and take necessary action to protect the life, health and safety and property of all of its personnel on the job site, the public, and the Owner.

5. Verification of Coverage

Prior to award of bid, Contractor agrees to furnish Owner with all applicable Certificates of Insurance signed by a person authorized by th insurer to bind coverage on its behalf.

If requested, Contractor shall provide Owner copies of all insurance policies, including all endorsements.

6. Right to Review, Audit and Inspect

Contractor understands and agrees that Owner may review, audit and inspect any and all of Contractor's records and operations to insure compliance with these Insurance Requirements.

7. Contractor understands and agrees that the failure to comply with any of these insurance, safety, or loss control provisions shall constitute default under this Agreement (Contract). Contractor also agrees that Owner may elect at its option any single remedy or penalty or any combination of remedies and penalties, as available, including but not limited to purchasing insurance and charging Contractor for any such insurance premiums purchased, or suspending or terminating this Agreement (Contract).

8. Additional Insured Endorsement

a. CONTRACTOR shall purchase and maintain liability insurance, as described above, specifically naming as additional insureds OWNER, ENGINEER, and OWNER/ENGINEER's Consultant as well as other individuals or entities identified, using Additional Insurance Endorsement Form CG 20 26 07 04, CG 81 11 05 06, CG 20 10 07 04, or equivalent form. General liability policies shall also be endorsed with Form CG 20 37 07 04 to include the "products-completed operations hazard." Endorsements or General Liability policy shall not exclude supervisory or inspection services. CONTRACTOR shall also provide an Additional Insured Endorsement for the automobile policy.

b. CONTRACTOR shall, prior to the start of any work on the project by an subcontractor receive: (1) a certificate of insurance from each subcontractor naming OWNER, ENGINEER, and OWNER/ENGINEER's Consultant as

well as other individuals and entities so identified as an additional insured, under each subcontractor's general liability for policy; and (2) the Additional Insured Endorsement language as required by paragraph 1 for subcontractor's operations. Certificate shall be Acord 25-S or equivalent.

c. That failure of CONTRACTOR or subcontractor to comply with the above requirements with respect to the Additional Insured Endorsement and/or Certificate of Insurance, shall not be construed as waiver of those provisions by OWNER, ENGINEER, and OWNER/ENGINEER's Consultant as well as other individuals and entities so identified.

E. DEFAULT

BIDDER/CONTRACTOR understands and agrees that the failure to comply with any of these insurance, safety, or loss control provisions shall constitute default and that LFUCG may elect at its option any single remedy or penalty or any combination of remedies and penalties, as available, including but not limited to purchasing insurance and charging BIDDER/CONTRACTOR for any such insurance premiums purchased, or suspending or terminating the work.

2.0 CONSENT DECREE REQUIREMENTS

The work to be provided through this Bid will assist the Lexington-Fayette Urban County Government (the "Owner") in successfully implementing the Agreement (Contract) and complying with any requirements which are related to the CONSENT DECREE entered in a case styled *United States & Commonwealth of Kentucky v. Lexington-Fayette Urban County Government,* United States District Court for the Eastern District of Kentucky, Civil Action No. 5:06-cv-386-KSF (the "CONSENT DECREE"). The services provided through this Bid are hereinafter referred to as the Agreement (Contract). The primary goal of the Agreement (Contract) is to provide the owner with the technical support and/or construction services necessary to successfully meet the obligations and deadlines of the CONSENT DECREE.

The Bidder shall familiarize itself with and shall at all times comply with the CONSENT DECREE, and all federal, state and local laws, ordinances, and regulations that in any manner affect the Agreement (Contract). Time is of the essence in the performance of Agreement (Contract). Bidder is aware that the Owner is subject to penalties for non-compliance with the CONSENT DECREE deadlines.

If delays result solely by reason of acts of the Bidder, the Bidder shall be held liable for any financial penalties incurred by the Owner as a result of the delay, including but not limited to those assessed pursuant to the CONSENT DECREE. In the event the parties cannot mutually agree upon the cause(s) associated with the delays in completing project deliverables, the Bidder must immediately notify the Owner in the event of such delay, and provide the Owner a written action plan within five (5) business days on how it will attempt to resolve the delay.

In the event that Bidder's delay or other nonperformance of its obligations hereunder results in the imposition of penalties against the Owner pursuant to the CONSENT DECREE, or the Owner otherwise suffers damage as a result of such delay or nonperformance, Bidder shall be solely liable to Owner for any and all such damages, including any costs and attorney's fees.

An electronic version of the CONSENT DECREE is available on the LFUCG web page for review or to print a copy at no charge.

3.0 STATE WAGE SCALE

State Wage Determination does not apply to this project.

END OF SECTION

PART VI

CONTRACT AGREEMENT

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PART VI

CONTRACT AGREEMENT

THIS AGREEMENT, made on the 3rd day of May, 2018, by and between **Lexington-Fayette Urban County Government**, acting herein called "OWNER" and **Herrick Company, Inc.**, doing business as *(an individual) (a partnership) (a corporation) located in the City of Lawrenceburg, County of Anderson, and State of Kentucky, hereinafter called "CONTRACTOR."

WITNESSETH: That the CONTRACTOR and the OWNER in consideration of **One Million Three Hundred Eighty-Nine Thousand** Dollars and **Zero** Cents (**$1,389,000.00/100**) quoted in the proposal (Lump Sum $1,058,000; Bid Alt. No. 1 $17,000; Bid Alt. No. 2A $149,000; Bid Alt. No. 3A $165,000) by the CONTRACTOR, dated **April 5, 2018**, hereby agree to commence and complete the construction described as follows:

1. SCOPE OF WORK

The CONTRACTOR shall furnish all the materials, supplies, machinery, equipment, tools, oversight, labor, insurance, and other accessories and services necessary to complete the project in accordance with the conditions and prices stated in the Proposal, the General Conditions, and the Special Conditions of the Contract, the Specifications and Contract Documents therefore as prepared by Strand Associates, Inc® for the **WEST HICKMAN WASTEWATER TREATMENT PLANT SCUM REMOVAL ADDITION AND AERATED SLUDGE HOLDING TANK NO. 3 COVER** project.

2. TIME OF COMPLETION

For the duration of the contract, the time period authorized by the OWNER for the proper execution of the Work by the Contract, in full, is hereby fixed as two hundred ten (210) calendar days. The time shall begin ten (10) days after the CONTRACTOR is given the Notice to Proceed with the Work.

3. ISSUANCE OF WORK ORDERS

Notice to begin Work will be given in whole or for part of the Work as determined by the OWNER pending the availability of funds.

4. THE CONTRACT SUM

The OWNER agrees to pay the CONTRACTOR in current funds for the performance of the Contract, as quoted in the proposal, subject to any additions and deductions, as provided therein. (Lump Sum $1,058,000; Bid Alt. No. 1 $17,000; Bid Alt. No. 2A $149,000; Bid Alt. No. 3A $165,000).

5. PROGRESS PAYMENTS

The OWNER shall make payments on account of the Contract, as provided in accordance with the General Conditions, as estimated by the Engineer, less the aggregate of previous payments.

6. ACCEPTANCE AND FINAL PAYMENT

Final payment shall be due within ninety (90) days after completion of the Work, provided the Work be then fully completed and the Contract fully accepted.

Before issuance of final certificate, the CONTRACTOR shall submit evidence satisfactory to the Engineer that all payrolls, material bills, and other indebtedness connected with the Work has been paid.

If, after the Work has been substantially completed, full completion thereof is materially delayed through no fault of the CONTRACTOR, and the ENGINEER so certifies, the OWNER shall upon certificate of the ENGINEER, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

7. THE CONTRACT DOCUMENTS

The Advertisement for Bids, Information for Bidders, the General Conditions, Supplemental General Conditions, Contract Agreement, Special Conditions, Technical Specifications, any and all Addenda, and Proposal, and Plan Drawings form the Contract, and they are fully a part of the Contract as if hereto attached or herein repeated.

8. EXTRA WORK

The OWNER, without invalidating the Contract, may order extra work or make changes by altering, adding to or deducting from the Work, the Contract Sum being adjusted accordingly. All such Work shall be executed and paid for in accordance with the General Conditions, which is a part of this Contract.

9. CONSENT DECREE REQUIREMENTS

9.1 OWNER, the United States Environmental Protection Agency, and the Commonwealth of Kentucky have entered into a Consent Decree in a case styled *United States, et al. v. Lexington-Fayette Urban County Government*, United States District Court for the Eastern District of Kentucky, Case No. 5:06-CV-00386 ("CONSENT DECREE"), that requires OWNER to complete numerous projects related to its sanitary sewer system and stormwater management program within specific periods of time.

9.2 TIME IS OF THE ESSENCE IN THE PERFORMANCE OF THIS AGREEMENT. CONTRACTOR is aware that the OWNER is subject to penalties for non-compliance with the CONSENT DECREE deadlines. The CONTRACTOR shall be specifically liable and responsible for payment of any and all penalties, fines, or fees assessed against or incurred by the OWNER as a result of any delay in, or non-performance of, any of the Contractor's obligations or responsibilities under this Contract, or for any other damages suffered by OWNER as a result of such delay or non-performance. This shall specifically include, but shall not be limited to, any penalty, fine, fee, or assessment against the OWNER by the U.S. Department of Justice, U.S. Environmental Protection Agency, and/or the Kentucky Energy and Environment Cabinet related to the Consent Decree.

9.3 The provisions of this Section and the various rates of compensation for Contractor's services provided for elsewhere in this Agreement have been agreed to in anticipation of the orderly and continuous progress of the PROJECT through completion.

9.4 If delays result by reason of acts of the OWNER or approving agencies, which are beyond the control of the CONTRACTOR, an extension of time for such delay will be considered. If delays occur, the CONTRACTOR shall immediately notify the OWNER, and within five (5) business days from the date of the delay apply in writing to the OWNER for an extension of time for such reasonable period as may be mutually agreed upon between the parties, and if approved, the PROJECT schedule shall be revised to reflect the extension. Such extension of time to the completion date shall in no way be construed to operate as a waiver on the part of the OWNER of any of its rights in the Agreement. Section 9.6 of this Agreement (Disputes) shall apply in the event the parties cannot agree upon an extension of time.

In the event that the overall delay resulting from the above-described causes is sufficient to prevent complete performance of the Agreement within six (6) months of the time specified herein, the fees to be paid to CONTRACTOR shall be subject to adjustment as agreed upon by the parties. Section 9.6 of this Agreement shall apply in the event the parties cannot agree upon an adjustment of fee.

9.5 If delays result solely by reason of acts of the CONTRACTOR, the CONTRACTOR shall be held liable for any financial penalties incurred by the OWNER as a result of the delay, including but not limited to those assessed pursuant to the CONSENT DECREE as provided in Section 9.2, above. Section 9.6 of this Agreement (Disputes), shall apply in the event the parties cannot mutually agree upon the cause(s) associated with delays in completing project deliverables. The CONTRACTOR must immediately notify the OWNER in the event of such delay, and provide the OWNER a written action plan within five (5) business days on how it will attempt to resolve the delay.

9.6 DISPUTES

Except as otherwise provided in this Agreement, any dispute hereunder may be resolved by agreement of the OWNER's Agent (Charles H. Martin, P.E., Director of Water Quality) and the CONTRACTOR. In the absence of such an agreement, the dispute shall be submitted to the OWNER's Commissioner, Department of Environmental Quality and Public Works, whose decision shall be final and conclusive unless determined by a court of competent jurisdiction to have been fraudulent, capricious, arbitrary, or so grossly erroneous as necessarily to imply bad faith. Pending a final decision of a dispute hereunder, the CONTRACTOR shall proceed diligently with the performance of the Agreement in accordance with the directions of the OWNER.

10. THE FOLLOWING IS AN ENUMERATION OF THE SPECIFICATIONS AND DRAWINGS (CONTRACT DOCUMENTS):

SPECIFICATIONS

SECTION NO.	TITLE	PAGES
I	Advertisement for Bids	AB-1 thru AB-6
II	Information for Bidders	IB-1 thru IB-11
III	Form of Proposal	P-1 thru P-24
IV	General Conditions	GC-1 thru GC-49
V	Special Conditions	SC-1 thru SC-8
VI	Contract Agreement	CA-1 thru CA-6
VII	Performance and Payment Bonds	PB-1 thru PB-7
	Technical Specifications (See Table of Contents on pages 00 01 10-1 thru 00 01 10-4)	01 11 00-1 thru 46 43 21-6
	Drawings attached to the Specifications (See Table of Contents on page 00 01 10-4)	
	Construction Drawings	Sheet 1 thru Sheet 30

IN WITNESSETH WHEREOF, the parties hereto have executed this Contract as of the date and year above written.

(Seal)

ATTEST:

Clerk of the Urban County Council

(Witness)

Lexington-Fayette Urban County Government.
Lexington, Kentucky
(Owner)

BY: _____
MAYOR

(Title)

(Seal)

HERRICK COMPANY, INC.
(Contractor)

(Secretary)* H. Douglas Herrick

BY: Donna S Herrick
Donna S. Herrick

(Witness)

Chief Executive Officer
(Title)

2176 Waddy Road, Lawrenceburg KY 40342
(Address and Zip Code)

IMPORTANT: *Strike out any non-applicable terms.

Secretary of the Owner should attest. If the CONTRACTOR is corporation, Secretary should attest. Give proper title of each person-executing Contract.

END OF SECTION

PART VII

PERFORMANCE AND PAYMENT BONDS

1. PERFORMANCE BOND

2. PAYMENT BOND

PART VII

PERFORMANCE BOND

Bond No. 54-220289

KNOW ALL MEN BY THESE PRESENTS, that

Herrick Company, Inc.
(Name of CONTRACTOR)

2176 Waddy Road, Lawrenceburg, KY 40342
(Address of CONTRACTOR)

a Corporation, hereinafter
(Corporation, Partnership, or Individual)

called Principal, and

United Fire & Casualty Company
(Name of Surety)

PO Box 73909, Cedar Rapids, IA 52407-3909
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT
200 East Main Street, Third Floor
Lexington, Kentucky 40507

hereinafter called "OWNER" in the penal sum of One Million Three Hundred Eighty Nine Thousand and No/100 Dollars, ($ 1,389,000.00), for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal by written agreement is entering into a Contract with OWNER for **WEST HICKMAN WASTEWATER TREATMENT PLANT SCUM REMOVAL ADDITION AND AERATED SLUDGE HOLDING TANK NO. 3 COVER PROJECT** in accordance with drawings and specifications prepared by: **Strand Associates, Inc®** 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 the Principal shall promptly and faithfully perform said Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

The Surety hereby waives notice of any alteration or extension of time made by the OWNER.

Whenever, Principal shall be, and declared by OWNER to be in default under the Contract, the OWNER having performed OWNER'S obligations thereunder, the Surety may promptly remedy the default, or shall promptly:

(1) Complete the Contract in accordance with its terms and conditions or

(2) Obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by Surety of the lowest responsible bidder, or if the OWNER elects, upon determination by the OWNER and Surety jointly of the lowest responsible bidder, arrange for a Contract between such bidder and OWNER, and make available as Work progresses (even though there may be a default or a succession of defaults under the Contract or Contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the Contract Price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "balance of the Contract Price", as used in this paragraph shall mean the total amount payable by OWNER to Principal under the Contract and any amendments thereto, less the amount properly paid by OWNER to Principal.

Any suit under this bond must be instituted before the expiration of two (2) years from the date on which final payment under the Contract falls due.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the OWNER named herein or the heirs, executors, administrators or successors of OWNER.

IN WITNESS WHEREOF, this instrument is executed in three (3) counterparts each one of which shall be

deemed an original, this the 3rd day of May, 2018.
(number)

ATTEST:

(Principal) Secretary

Herrick Compay, Inc.
Principal

BY: Donna S Herrick (s)

2176 Waddy Road
(Address)
Lawrenceburg, KY 40342

Witness as to Principal

2176 Waddy Road
(Address)
Lawrenceburg KY 40342

United Fire & Casualty Company
Surety

ATTEST:

BY: Leigh McCarthy
Leigh McCarthy, Attorney-in-Fact

PO Box 73909
(Address)
Cedar Rapids, IA 73909

(Surety) Secretary

(SEAL)

Witness as to Surety Barbara Duncan

2307 River Road, Suite 200
(Address)
Louisville, KY 40206

TITLE: _____
Surety

BY: _____

TITLE: Underwriting Assistant

NOTE: The number of executed counterparts of the bond shall coincide with the number of executed counterparts of the Contract.

PART VII

PAYMENT BOND

Bond No. 54-220289

KNOW ALL MEN BY THESE PRESENT: that

Herrick Company, Inc.

(Name of Contractor)

2176 Waddy Road, Lawrenceburg, KY 40342

(Address of Contractor)

a Corporation, hereinafter

(Corporation, Partnership or Individual)

called Principal, and

United Fire & Casualty Company

(Name of Surety)

PO Box 73909, Cedar Rapids, IA 52407-3909

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto:

LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT
200 East Main Street, Third Floor
Lexington, Kentucky 40507

Obligee, hereinafter called OWNER, for the use and benefit of claimants as hereinafter defined, in the amount of One Million Three Hundred Eighty Nine Thousand and No/100---------- Dollars ($ 1,389,000.00) the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal by written agreement is entering into a Contract with OWNER **WEST HICKMAN WASTEWATER TREATMENT PLANT SCUM REMOVAL ADDITION AND AERATED SLUDGE HOLDING TANK NO. 3 COVER PROJECT** in accordance with drawings and specifications prepared by: **Strand Associates, Inc®** 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 make payment to all claimants as hereinafter defined for all labor and 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, subject, however, to the following conditions.

1. A claimant is defined as one having a direct contract with the Principal or with a Subcontractor of the Principal for labor, material, or both, used or reasonably required for

use in the performance of the Contract, labor and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental of equipment directly applicable to the Contract.

2. The above named Principal and Surety hereby jointly and severally agree with the OWNER that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work or labor was done or performed, or materials were furnished by such claimant, may sue on this bond for the use of such claimant, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon. The OWNER shall not be liable for the payment of any costs or expenses of any such suit.

3. No suit or action shall be commenced hereunder by any claimant:

(a) Unless claimant, other than one having a direct contract with the Principal, shall have given written notice to any two of the following: The Principal, the OWNER, or the Surety above named, within ninety (90) days after such claimant did or performed the last of the Work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the Work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Principal, OWNER, or Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service need not be made by a public officer.

(b) After the expiration of one (1) year following the date on which Principal ceased Work on said Contract, it being understood, however, that if any limitation embodied in this bond is prohibited by any law controlling the construction hereof such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

(c) Other than in a state court of competent jurisdiction in and for the county or other political subdivision of the state in which the project, or any part thereof, is situated, or in the United States District Court for the district in which the project, or any part thereof, is situated, and not elsewhere.

4. The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics' liens which may be filed of record against aid improvement, whether or not claim for the amount of such lien be presented under and against this bond.

IN WITNESS WHEREOF, this instrument is executed in three (3) counterparts, each one of
(number)

which shall be deemed an original, this the 3rd day of May, 2018.

ATTEST:

Herrick Company, Inc.
(Principal)

(Principal) Secretary

(SEAL)

BY: Donna S Herrick (s)

2176 Waddy Road
(Address)
Lawrenceburg, KY 40342

(Witness to Principal)
2176 Waddy Road
(Address)
Lawrenceburg KY 40342

United Fire & Casualty Company
(Surety)

ATTEST:

BY: Leigh McCarthy
Leigh McCarthy, (Attorney-in-Fact)

(Surety) Secretary

(SEAL)

Witness as to Surety Barbara Duncan
2307 River Road, Suite 200
(Address)
Louisville, KY 40206

PO Box 73909
(Address)
Cedar Rapids, IA 73909

NOTE: The number of executed counterparts of the bond shall coincide with the number of executed counterparts of the Contract.

END OF SECTION

UNITED FIRE & CASUALTY COMPANY, CEDAR RAPIDS, IA
UNITED FIRE & INDEMNITY COMPANY, WEBSTER, TX
FINANCIAL PACIFIC INSURANCE COMPANY, ROCKLIN, CA
CERTIFIED COPY OF POWER OF ATTORNEY
(original on file at Home Office of Company – See Certification)

Inquiries: Surety Department
118 Second Ave SE
Cedar Rapids, IA 52401

KNOW ALL PERSONS BY THESE PRESENTS, That UNITED FIRE & CASUALTY COMPANY, a corporation duly organized and existing under the laws of the State of Iowa; UNITED FIRE & INDEMNITY COMPANY, a corporation duly organized and existing under the laws of the State of Texas; and FINANCIAL PACIFIC INSURANCE COMPANY, a corporation duly organized and existing under the laws of the State of California (herein collectively called the Companies), and having their corporate headquarters in Cedar Rapids, State of Iowa, does make, constitute and appoint JAMES T. SMITH, JAMES H. MARTIN, BROOK T. SMITH, RAYMOND M. HUNDLEY, DEBORAH NEICHTER, BONNIE J. ROWE, MICHELE LACROSSE, SUMMER BETTING, JASON CROMWELL, LEIGH MCCARTHY, EACH INDIVIDUALLY of LOUISVILLE KY

their true and lawful Attorney(s)-in-Fact with power and authority hereby conferred to sign, seal and execute in its behalf all lawful bonds, undertakings and other obligatory instruments of similar nature provided that no single obligation shall exceed $75,000,000.00 and to bind the Companies thereby as fully and to the same extent as if such instruments were signed by the duly authorized officers of the Companies and all of the acts of said Attorney, pursuant to the authority hereby given and hereby ratified and confirmed.

The Authority hereby granted shall expire the 1st day of August, 2018 unless sooner revoked by UNITED FIRE & CASUALTY COMPANY, UNITED FIRE & INDEMNITY COMPANY, AND FINANCIAL PACIFIC INSURANCE COMPANY.

This Power of Attorney is made and executed pursuant to and by authority of the following bylaw duly adopted on May 15, 2013, by the Boards of Directors of UNITED FIRE & CASUALTY COMPANY, UNITED FIRE & INDEMNITY COMPANY, and FINANCIAL PACIFIC INSURANCE COMPANY.

"Article VI – Surety Bonds and Undertakings"

Section 2, Appointment of Attorney-in-Fact. "The President or any Vice President, or any other officer of the Companies may, from time to time, appoint by written certificates attorneys-in-fact to act in behalf of the Companies in the execution of policies of insurance, bonds, undertakings and other obligatory instruments of like nature. The signature of any officer authorized hereby, and the Corporate seal, may be affixed by facsimile to any power of attorney or special power of attorney or certification of either authorized hereby; such signature and seal, when so used, being adopted by the Companies as the original signature of such officer and the original seal of the Companies, to be valid and binding upon the Companies with the same force and effect as though manually affixed. Such attorneys-in-fact, subject to the limitations set forth in their respective certificates of authority shall have full power to bind the Companies by their signature and execution of any such instruments and to attach the seal of the Companies thereto. The President or any Vice President, the Board of Directors or any other officer of the Companies may at any time revoke all power and authority previously given to any attorney-in-fact.

IN WITNESS WHEREOF, the COMPANIES have each caused these presents to be signed by its vice president and its corporate seal to be hereto affixed this 1st day of August, 2016

UNITED FIRE & CASUALTY COMPANY
UNITED FIRE & INDEMNITY COMPANY
FINANCIAL PACIFIC INSURANCE COMPANY

By: Dennis J. Richmann Vice President

State of Iowa, County of Linn, ss:
On 1st day of August, 2016, before me personally came Dennis J. Richmann to me known, who being by me duly sworn, did depose and say; that he resides in Cedar Rapids, State of Iowa; that he is a Vice President of UNITED FIRE & CASUALTY COMPANY, a Vice President of UNITED FIRE & INDEMNITY COMPANY, and a Vice President of FINANCIAL PACIFIC INSURANCE COMPANY the corporations described in and which executed the above instrument; that he knows the seal of said corporations; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said corporations and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said corporations.

Judith A. Davis
Iowa Notarial Seal
Commission number 173041
My Commission Expires 04/23/2018

Judith A Davis Notary Public
My commission expires: 04/23/2018

I, David A. Lange, Secretary of UNITED FIRE & CASUALTY COMPANY and Assistant Secretary of UNITED FIRE & INDEMNITY COMPANY, and Assistant Secretary of FINANCIAL PACIFIC INSURANCE COMPANY, do hereby certify that I have compared the foregoing copy of the Power of Attorney and affidavit, and the copy of the Section of the bylaws and resolutions of said Corporations as set forth in said Power of Attorney, with the ORIGINALS ON FILE IN THE HOME OFFICE OF SAID CORPORATIONS, and that the same are correct transcripts thereof, and of the whole of the said originals, and that the said Power of Attorney has not been revoked and is now in full force and effect.

In testimony whereof I have hereunto subscribed my name and affixed the corporate seal of the said Corporations this _____ day of _____, 20_____.

By: David A. Lange
Secretary, UF&C
Assistant Secretary, UF&I/FPIC

BPOA0045 0115

Client#: 118984 41HERRICKCOM

ACORD™ CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 05/18/2018

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME: Karen Marshall	
J Smith Lanier & Co-Lexington Marsh & McLennan Agency, LLC P O Box 2030 Lexington, KY 40588	PHONE (A/C, No, Ext): 800 796-3567	FAX (A/C, No): 859 254-8020
	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A : Cincinnati Insurance Co.	10677
INSURED Herrick Company, Inc. 1385 Tracy Road Lawrenceburg, KY 40342	INSURER B : KY Assoc. General Contractors	
	INSURER C : Travelers	
	INSURER D : Philadelphia Insurance Companies	
	INSURER E :	
	INSURER F :	

COVERAGES CERTIFICATE NUMBER: REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR X PD Ded:500 GEN'L AGGREGATE LIMIT APPLIES PER: POLICY PRO-JECT LOC OTHER:			EPP0347245	10/11/2017	10/11/2018	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$1,000,000 $500,000 $10,000 $1,000,000 $2,000,000 $2,000,000 $
A	AUTOMOBILE LIABILITY X ANY AUTO ALL OWNED AUTOS SCHEDULED AUTOS X HIRED AUTOS X NON-OWNED AUTOS X Drive Oth Car			EBA0347245	10/11/2017	10/11/2018	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$1,000,000 $ $ $ $
A	X UMBRELLA LIAB X OCCUR EXCESS LIAB CLAIMS-MADE DED X RETENTION $0			EPP0347245	10/11/2017	10/11/2018	EACH OCCURRENCE AGGREGATE	$5,000,000 $5,000,000 $
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y/N N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N/A		007033	01/01/2018	01/01/2019	X PER STATUTE OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $4,000,000 $4,000,000 $4,000,000
A	Builders Risk			EPP0347245	10/11/2017	10/11/2018	$3,000,000 - Limit $2,500 - Deductible	
C	Excess Umbr Liab			ZUP15T4005217NF	04/28/2018	10/11/2018	$5,000,000-Each Occ/Agg	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Coverages continued...
Pollution Liability
Insurer Letter: D
Policy Number: PPK1235310
Policy Term: 09/05/2016 - 09/05/2018
(See Attached Descriptions)

CERTIFICATE HOLDER

Lexington Fayette Urban County Government
200 E Main Street
Lexington, KY 40507-0000

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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KYM

DESCRIPTIONS (Continued from Page 1)

$2,000,000 - Each Occurrence
$6,000,000 - Aggregate
$5,000 - Deductible

PROJECT: West Hickman Wastewater Treatment Plant Scum Removal Addition and Aerated Sludge Holding Tank No. 3 Cover Project, Bid No. 22-2018
The Lexington-Fayette Urban County Government and Strand Associates, Inc. are included as additional insured when required by written contract but only with respects to the auto liability and general liability insurance including ongoing operations per CG2010 and products and completed operations hazard per CG2037 and subject to the provisions and limitations of the policy. The auto liability and general liability are written on a primary and non-contributory basis when required by written contract, subject to the provisions and limitations of the policy. The Umbrella policy is on a following form basis over the insuring conditions of the underlying scheduled Liability policies. A 30 Day notice of cancellation applies with a 14 day exception for non-payment, in favor of certificate holder when required by written contract, with respect to the general liability insurance and subject to the provisions and limitations of the policy. LFUCG and Strand Associates, Inc. are included as loss payee with respect to their interest in the Builder's Risk coverage and subject to the provisions and limitations of the policy

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED - OWNERS, LESSEES OR CONTRACTORS - SCHEDULED PERSON OR ORGANIZATION - YOUR WORK

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name of Person or Organization (Additional Insured):
LEXINGTON FAYETTE URBAN COUNTY GOVERNMENT
200 E MAIN ST
LEXINGTON, KY 40507-1310

WHO IS AN INSURED (Section II) is amended to include as an insured the person or organization shown in the Schedule, but only with respect to liability arising out of "your work" for that Additional Insured by you or on your behalf.

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THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

CONTRACTORS' COMMERCIAL GENERAL LIABILITY BROADENED ENDORSEMENT

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

A. Endorsement - Table of Contents:

Coverage:	Begins on Page:
1. Employee Benefit Liability Coverage	2
2. Unintentional Failure to Disclose Hazards	7
3. Damage to Premises Rented to You	8
4. Supplementary Payments	9
5. Medical Payments	9
6. Voluntary Property Damage (Coverage **a.**) and Care, Custody or Control Liability Coverage (Coverage **b.**)	9
7. 180 Day Coverage for Newly Formed or Acquired Organizations	10
8. Waiver of Subrogation	10
9. Automatic Additional Insured - Specified Relationships:	10
• Managers or Lessors of Premises;	
• Lessor of Leased Equipment;	
• Vendors;	
• State or Political Subdivisions - Permits Relating to Premises;	
• State or Political Subdivisions - Permits; and	
• Contractors' Operations	
10. Broadened Contractual Liability - Work Within 50' of Railroad Property	14
11. Property Damage to Borrowed Equipment	14
12. Employees as Insureds - Specified Health Care Services:	14
• Nurses;	
• Emergency Medical Technicians; and	
• Paramedics	
13. Broadened Notice of Occurrence	14

B. Limits of Insurance:

The Commercial General Liability Limits of Insurance apply to the insurance provided by this endorsement, except as provided below:

1. Employee Benefit Liability Coverage

Each Employee Limit:	$ 1,000,000
Aggregate Limit:	$ 3,000,000
Deductible:	$ 1,000

3. Damage to Premises Rented to You

The lesser of:

a. The Each Occurrence Limit shown in the Declarations; or

b. $500,000 unless otherwise stated $ _____

4. Supplementary Payments

a. Bail bonds:	$	1,000
b. Loss of earnings:	$	350

5. Medical Payments

Medical Expense Limit: $ 10,000

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b. **Deductible Clause**

(1) Our obligation to pay damages on your behalf applies only to the amount of damages for each "occurrence" which are in excess of the deductible amount stated in Section **B. Limits of Insurance, 6. Voluntary Property Damage and Care, Custody or Control Liability Coverage** of this endorsement. The limits of insurance will not be reduced by the application of such deductible amount.

(2) Condition **2. Duties in the Event of Occurrence, Offense, Claim or Suit**, applies to each claim or "suit" irrespective of the amount.

(3) We may pay any part or all of the deductible amount to effect settlement of any claim or "suit" and, upon notification of the action taken, you shall promptly reimburse us for such part of the deductible amount as has been paid by us.

7. **180 Day Coverage for Newly Formed or Acquired Organizations**

SECTION II - WHO IS AN INSURED is amended as follows:

Subparagraph **a.** of Paragraph **4.** is hereby deleted and replaced by the following:

a. Insurance under this provision is afforded only until the 180th day after you acquire or form the organization or the end of the policy period, whichever is earlier;

8. **Waiver of Subrogation**

SECTION IV - COMMERCIAL GENERAL LIABILITY CONDITIONS, 9. Transfer of Rights of Recovery Against Others to Us is hereby amended by the addition of the following:

We waive any right of recovery we may have because of payments we make for injury or damage arising out of your ongoing operations or "your work" done under a written contract requiring such waiver with that person or organization and included in the "products-completed operations hazard". However, our rights may only be waived prior to the "occurrence" giving rise to the injury or damage for which we make payment under this Coverage Part. The insured must do nothing after a loss to impair our rights. At our request, the insured will bring "suit" or transfer those rights to us and help us enforce those rights.

9. **Automatic Additional Insured - Specified Relationships**

a. The following is hereby added to **SECTION II - WHO IS AN INSURED**:

(1) Any person or organization described in Paragraph **9.a.(2)** below (hereinafter referred to as additional insured) whom you are required to add as an additional insured under this Coverage Part by reason of:

(a) A written contract or agreement; or

(b) An oral agreement or contract where a certificate of insurance showing that person or organization as an additional insured has been issued,

is an insured, provided:

(a) The written or oral contract or agreement is:

1) Currently in effect or becomes effective during the policy period; and

2) Executed prior to an "occurrence" or offense to which this insurance would apply; and

(b) They are not specifically named as an additional insured under any other provision of, or endorsement added to, this Coverage Part.

(2) Only the following persons or organizations are additional insureds under this endorsement, and insurance coverage provided to such additional insureds is limited as provided herein:

(a) The manager or lessor of a premises leased to you with whom you have agreed per Paragraph **9.a.(1)** above to provide insurance, but only with respect to liability arising out of the ownership, maintenance or use of that part of a premises leased to you, subject to the following additional exclusions:

This insurance does not apply to:

1) Any "occurrence" which takes place after

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of the additional insured; or

2) The rendering of, or failure to render, any professional architectural, engineering or surveying services, including:

a) The preparing, approving or failing to prepare or approve maps, shop drawings, opinions, reports, surveys, field orders, change orders or drawings and specifications; and

b) Supervisory, inspection, architectural or engineering activities.

3) "Your work" for which a consolidated (wrap-up) insurance program has been provided by the primecontractor-project manager or owner of the construction project in which you are involved.

b. Only with regard to insurance provided to an additional insured designated under Paragraph **9.a.(2)** Subparagraph **(f)** above, **SECTION III - LIMITS OF INSURANCE** is amended to include:

The limits applicable to the additional insured are those specified in the written contract or agreement or in the Declarations of this Coverage Part, whichever are less. If no limits are specified in the written contract or agreement, or if there is no written contract or agreement, the limits applicable to the additional insured are those specified in the Declarations of this Coverage Part. The limits of insurance are inclusive of and not in addition to the limits of insurance shown in the Declarations.

c. **SECTION IV - COMMERCIAL GENERAL LIABILITY CONDITIONS** is hereby amended as follows:

(1) Condition **5. Other Insurance** is amended to include:

(a) Where required by a written contract or agreement, this insurance is primary and / or noncontributory as respects any other insurance policy issued to the additional insured, and such other insurance policy shall be excess and / or noncontributing, whichever applies, with this insurance.

(b) Any insurance provided by this endorsement shall be primary to other insurance available to the additional insured except:

1) As otherwise provided in **SECTION IV - COMMERCIAL GENERAL LIABILITY CONDITIONS, 5. Other Insurance, b. Excess Insurance**; or

2) For any other valid and collectible insurance available to the additional insured as an additional insured by attachment of an endorsement to another insurance policy that is written on an excess basis. In such case, the coverage provided under this endorsement shall also be excess.

(2) Condition **11. Conformance to Specific Written Contract or Agreement** is hereby added:

11. Conformance to Specific Written Contract or Agreement

With respect to additional insureds described in Paragraph **9.a.(2)(f)** above only:

If a written contract or agreement between you and the additional insured specifies that coverage for the additional insured:

a. Be provided by the Insurance Services Office additional insured form number **CG 20 10** or **CG 20 37** (where edition specified); or

b. Include coverage for completed operations; or

c. Include coverage for "your work";

and where the limits or coverage provided to the addi-

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companying or containing such products; or

b) When liability included within the "products-completed operations hazard" has been excluded under this Coverage Part with respect to such products.

(d) Any state or political subdivision with which you have agreed per Paragraph **9.a.(1)** above to provide insurance, subject to the following additional provision:

This insurance applies only with respect to the following hazards for which the state or political subdivision has issued a permit in connection with premises you own, rent or control and to which this insurance applies:

1) The existence, maintenance, repair, construction, erection, or removal of advertising signs, awnings, canopies, cellar entrances, coal holes, driveways, manholes, marquees, hoist away openings, sidewalk vaults, street banners, or decorations and similar exposures; or

2) The construction, erection, or removal of elevators; or

3) The ownership, maintenance, or use of any elevators covered by this insurance.

(e) Any state or political subdivision with which you have agreed per Paragraph **9.a.(1)** above to provide insurance, subject to the following provisions:

1) This insurance applies only with respect to operations performed by you or on your behalf for which the state or political subdivision has issued a permit.

2) This insurance does not apply to "bodily injury", "property damage" or "personal and advertising injury" arising out of operations performed for the state or political subdivision.

(f) Any person or organization with which you have agreed per Paragraph **9.a.(1)** above to provide insurance, but only with respect to liability arising out of "your work" performed for that additional insured by you or on your behalf. A person or organization's status as an insured under this provision of this endorsement continues for only the period of time required by the written contract or agreement, but in no event beyond the expiration date of this Coverage Part. If there is no written contract or agreement, or if no period of time is required by the written contract or agreement, a person or organization's status as an insured under this endorsement ends when your operations for that insured are completed.

(3) Any insurance provided to an additional insured designated under Paragraph **9.a.(2)**:

(a) Subparagraphs (e) and (f) does not apply to "bodily injury" or "property damage" included within the "products-completed operations hazard";

(b) Subparagraphs (a), (b), (d), (e) and (f) does not apply to "bodily injury", "property damage" or "personal and advertising injury" arising out of the sole negligence or willful misconduct of the additional insured or their agents, "employees" or any other representative of the additional insured; or

(c) Subparagraph (f) does not apply to "bodily injury", "property damage" or "personal and advertising injury" arising out of:

1) Defects in design furnished by or on behalf

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you cease to be a tenant in that premises.

2) Structural alterations, new construction or demolition operations performed by or on behalf of such additional insured.

(b) Any person or organization from which you lease equipment with whom you have agreed per Paragraph **9.a.(1)** above to provide insurance. Such person(s) or organization(s) are insureds solely with respect to their liability arising out of the maintenance, operation or use by you of equipment leased to you by such person(s) or organizations(s). However, this insurance does not apply to any "occurrence" which takes place after the equipment lease expires.

(c) Any person or organization (referred to below as vendor) with whom you have agreed per Paragraph **9.a.(1)** above to provide insurance, but only with respect to "bodily injury" or "property damage" arising out of "your products" which are distributed or sold in the regular course of the vendor's business, subject to the following additional exclusions:

1) The insurance afforded the vendor does not apply to:

a) "Bodily injury" or "property damage" for which the vendor is obligated to pay damages by reason of the assumption of liability in a contract or agreement. This exclusion does not apply to liability for damages that the vendor would have in the absence of the contract or agreement;

b) Any express warranty unauthorized by you;

c) Any physical or chemical change in the product made intentionally by the vendor;

d) Repackaging, unless unpacked solely for the purpose of inspection, demonstration, testing, or the substitution of parts under instructions from the manufacturer, and then repackaged in the original container;

e) Any failure to make such inspections, adjustments, tests or servicing as the vendor has agreed to make or normally undertakes to make in the usual course of business, in connection with the distribution or sale of the products;

f) Demonstration, installation, servicing or repair operations, except such operations performed at the vendor's premises in connection with the sale of the product;

g) Products which, after distribution or sale by you, have been labeled or relabeled or used as a container, part or ingredient of any other thing or substance by or for the vendor.

2) This insurance does not apply to any insured person or organization:

a) From whom you have acquired such products, or any ingredient, part or container, entering into, ac-

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caused by or resulting from rain, snow, sleet or ice, whether driven by wind or not.

c. Limit of Insurance

The Damage to Premises Rented to You Limit as shown in the Declarations is amended as follows:

(2) Paragraph **6.** of **SECTION III - LIMITS OF INSURANCE** is hereby deleted and replaced by the following:

6. Subject to **5.** above, the Damage to Premises Rented to You Limit is the most we will pay under **COVERAGE A. BODILY INJURY AND PROPERTY DAMAGE LIABILITY**, for damages because of "property damage" to premises while rented to you or temporarily occupied by you with permission of the owner, arising out of any one "occurrence" to which this insurance applies.

(3) The amount we will pay is limited as described in Section **B. Limits of Insurance, 3. Damage to Premises Rented to You** of this endorsement.

4. Supplementary Payments

Under **SECTION I - COVERAGE, SUPPLEMENTARY PAYMENTS - COVERAGES A AND B**:

a. Paragraph **2.** is replaced by the following:

Up to the limit shown in Section **B. Limits of Insurance, 4.a.** Bail Bonds of this endorsement for cost of bail bonds required because of accidents or traffic law violations arising out of the use of any vehicle to which the Bodily Injury Liability Coverage applies. We do not have to furnish these bonds.

b. Paragraph **4.** is replaced by the following:

All reasonable expenses incurred by the insured at our request to assist us in the investigation or defense of the claim or "suit", including actual loss of earnings up to the limit shown in Section **B. Limits of Insurance, 4.b.** Loss of Earnings of this endorsement per day because of time off from work.

5. Medical Payments

The Medical Expense Limit of Any One Person as stated in the Declarations is amended to the limit shown in Section **B. Limits of Insurance, 5. Medical Payments** of this endorsement.

6. Voluntary Property Damage and Care, Custody or Control Liability Coverage

a. Voluntary Property Damage Coverage

We will pay for "property damage" to property of others arising out of operations incidental to the insured's business when:

(1) Damage is caused by the insured; or

(2) Damage occurs while in the insured's possession.

With your consent, we will make these payments regardless of fault.

b. Care, Custody or Control Liability Coverage

SECTION I - COVERAGES, COVERAGE A. BODILY INJURY AND PROPERTY DAMAGE LIABILITY, 2. Exclusions, j. Damage to Property, Subparagraphs **(3)**, **(4)** and **(5)** do not apply to "property damage" to the property of others described therein.

With respect to the insurance provided by this section of the endorsement, the following additional provisions apply:

a. The Limits of Insurance shown in the Declarations are replaced by the limits designated in Section **B. Limits of Insurance, 6. Voluntary Property Damage and Care, Custody or Control Liability Coverage** of this endorsement with respect to coverage provided by this endorsement. These limits are inclusive of and not in addition to the limits being replaced. The Limits of Insurance shown in Section **B. Limits of Insurance, 6. Voluntary Property Damage and Care, Custody or Control Liability Coverage** of this endorsement fix the most we will pay in any one "occurrence" regardless of the number of:

(1) Insureds;

(2) Claims made or "suits" brought; or

(3) Persons or organizations making claims or bringing "suits".

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3. **Damage to Premises Rented to You**

a. The last Subparagraph of Paragraph **2. SECTION I - COVERAGES, COVERAGE A. - BODILY INJURY AND PROPERTY DAMAGE, 2. LIABILITY Exclusions** is hereby deleted and replaced by the following:

Exclusions **c.** through **q.** do not apply to damage by fire, explosion, lightning, smoke or soot to premises while rented to you or temporarily occupied by you with permission of the owner.

b. The insurance provided under **SECTION I - COVERAGES, COVERAGE A. BODILY INJURY AND PROPERTY DAMAGE LIABILITY** applies to "property damage" arising out of water damage to premises that are both rented to and occupied by you.

(1) As respects Water Damage Legal Liability, as provided in Paragraph **3.b.** above:

The exclusions under **SECTION I - COVERAGES, COVERAGE A. BODILY INJURY AND PROPERTY DAMAGE LIABILITY, 2. Exclusions**, other than **i. War** and the **Nuclear Energy Liability Exclusion**, are deleted and the following are added:

This insurance does not apply to:

(a) "Property damage":

1) Assumed in any contract; or

2) Loss caused by or resulting from any of the following:

a) Wear and tear;

b) Rust, corrosion, fungus, decay, deterioration, hidden or latent defect or any quality in property that causes it to damage or destroy itself;

c) Smog;

d) Mechanical breakdown including rupture or bursting caused by centrifugal force;

e) Settling, cracking, shrinking or expansion; or

f) Nesting or infestation, or discharge or release of waste products or secretions, by insects, birds, rodents or other animals.

(b) Loss caused directly or indirectly by any of the following:

1) Earthquake, volcanic eruption, landslide or any other earth movement;

2) Water that backs up or overflows from a sewer, drain or sump;

3) Water under the ground surface pressing on, or flowing or seeping through:

a) Foundations, walls, floors or paved surfaces;

b) Basements, whether paved or not; or

c) Doors, windows or other openings.

(c) Loss caused by or resulting from water that leaks or flows from plumbing, heating, air conditioning, or fire protection systems caused by or resulting from freezing, unless:

1) You did your best to maintain heat in the building or structure; or

2) You drained the equipment and shut off the water supply if the heat was not maintained.

(d) Loss to or damage to:

1) Plumbing, heating, air conditioning, fire protection systems, or other equipment or appliances; or

2) The interior of any building or structure, or to personal property in the building or structure

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in any benefit included in the "employee benefit program".

However, "administration" does not include:

a. Handling payroll deductions; or

b. The failure to effect or maintain any insurance or adequate limits of coverage of insurance, including but not limited to unemployment insurance, social security benefits, workers' compensation and disability benefits.

2. "Cafeteria plans" means plan authorized by applicable law to allow "employees" to elect to pay for certain benefits with pre-tax dollars.

3. "Employee benefit programs" means a program providing some or all of the following benefits to "employees", whether provided through a "cafeteria plan" or otherwise:

a. Group life insurance; group accident or health insurance; dental, vision and hearing plans; and flexible spending accounts; provided that no one other than an "employee" may subscribe to such benefits and such benefits are made generally available to those "employees" who satisfy the plan's eligibility requirements;

b. Profit sharing plans, employee savings plans, employee stock ownership plans, pension plans and stock subscription plans, provided that no one other than an "employee" may subscribe to such benefits and such benefits are made generally available to all "employees" who are eligible under the plan for such benefits;

c. Unemployment insurance, social security benefits, workers' compensation and disability benefits; and

d. Vacation plans, including buy and sell programs; leave of absence programs, including military, maternity, family, and civil leave; tuition assistance plans; transportation and health club subsidies.

(2) The following definitions are deleted in their entirety and replaced by the following:

21. "Suit" means a civil proceeding in which money damages because of an act, error or omission to which this insurance applies are alleged. "Suit" includes:

a. An arbitration proceeding in which such damages are claimed and to which the insured must submit or does submit with our consent;

b. Any other alternative dispute resolution proceeding in which such damages are claimed and to which the insured submits with our consent; or

c. An appeal of a civil proceeding.

8. "Employee" means a person actively employed, formerly employed, on leave of absence or disabled, or retired. "Employee" includes a "leased worker". "Employee" does not include a "temporary worker".

2. **Unintentional Failure to Disclose Hazards**

SECTION IV - COMMERCIAL GENERAL LIABILITY CONDITIONS, 7. Representations is hereby amended by the addition of the following:

Based on our dependence upon your representations as to existing hazards, if unintentionally you should fail to disclose all such hazards at the inception date of your policy, we will not reject coverage under this Coverage Part based solely on such failure.

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b. If a claim is made or "suit" is brought against any insured, you must:

(1) Immediately record the specifics of the claim or "suit" and the date received; and

(2) Notify us as soon as practicable.

You must see to it that we receive written notice of the claim or "suit" as soon as practicable.

c. You and any other involved insured must:

(1) Immediately send us copies of any demands, notices, summonses or legal papers received in connection with the claim or "suit";

(2) Authorize us to obtain records and other information;

(3) Cooperate with us in the investigation or settlement of the claim or defense against the "suit"; and

(4) Assist us, upon our request, in the enforcement of any right against any person or organization which may be liable to the insured because of an act, error or omission to which this insurance may also apply.

d. No insured will, except at that insured's own cost, voluntarily make a payment, assume any obligation, or incur any expense without our consent.

(2) Item **5. Other Insurance** is deleted in its entirety and replaced by the following:

5. Other Insurance

If other valid and collectible insurance is available to the insured for a loss we cover under this Coverage Part, our obligations are limited as follows:

a. Primary Insurance

This insurance is primary except when **c.** below applies. If this insurance is primary, our obligations are not affected unless any of the other insurance is also primary. Then, we will share with all that other insurance by the method described in **b.** below.

b. Method of Sharing

If all of the other insurance permits contribution by equal shares, we will follow this method also. Under this approach each insurer contributes equal amounts until it has paid its applicable limit of insurance or none of the loss remains, whichever comes first.

If any of the other insurance does not permit contribution by equal shares, we will contribute by limits. Under this method, each insurer's share is based on the ratio of its applicable limit of insurance to the total applicable limits of insurance of all insurers.

c. No Coverage

This insurance shall not cover any loss for which the insured is entitled to recovery under any other insurance in force previous to the effective date of this Coverage Part.

e. Additional Definitions

As **respects Employee Benefit Liability Coverage, SECTION V - DEFINITIONS** is amended as follows:

(1) The following definitions are added:

1. "Administration" means:

a. Providing information to "employees", including their dependents and beneficiaries, with respect to eligibility for or scope of "employee benefit programs";

b. Interpreting the "employee benefit programs";

c. Handling records in connection with the "employee benefit programs"; or

d. Effecting, continuing or terminating any "employee's" participation

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(b) Claims made or "suits" brought;

(c) Persons or organizations making claims or bringing "suits";

(d) Acts, errors or omissions; or

(e) Benefits included in your "employee benefit program".

(2) The Aggregate Limit shown in Section **B. Limits of Insurance, 1. Employee Benefit Liability Coverage** of this endorsement is the most we will pay for all damages because of acts, errors or omissions negligently committed in the "administration" of your "employee benefit program".

(3) Subject to the limit described in (2) above, the Each Employee Limit shown in Section **B. Limits of Insurance, 1. Employee Benefit Liability Coverage** of this endorsement is the most we will pay for all damages sustained by any one "employee", including damages sustained by such "employee's" dependents and beneficiaries, as a result of:

(a) An act, error or omission; or

(b) A series of related acts, errors or omissions, regardless of the amount of time that lapses between such acts, errors or omissions,

negligently committed in the "administration" of your "employee benefit program".

However, the amount paid under this endorsement shall not exceed, and will be subject to the limits and restrictions that apply to the payment of benefits in any plan included in the "employee benefit program".

(4) **Deductible Amount**

(a) Our obligation to pay damages on behalf of the insured applies only to the amount of damages in excess of the deductible amount stated in the Declarations as applicable to Each Employee. The limits of insurance shall not be reduced by the amount of this deductible.

(b) The deductible amount stated in the Declarations applies to all damages sustained by any one "employee", including such "employee's" dependents and beneficiaries, because of all acts, errors or omissions to which this insurance applies.

(c) The terms of this insurance, including those with respect to:

1) Our right and duty to defend the insured against any "suits" seeking those damages; and

2) Your duties, and the duties of any other involved insured, in the event of an act, error or omission, or claim,

apply irrespective of the application of the deductible amount.

(d) We may pay any part or all of the deductible amount to effect settlement of any claim or "suit" and, upon notification of the action taken, you shall promptly reimburse us for such part of the deductible amount as we have paid.

d. Additional Conditions

As respects **Employee Benefit Liability Coverage, SECTION IV - COMMERCIAL GENERAL LIABILITY CONDITIONS** is amended as follows:

(1) Item **2. Duties in the Event of Occurrence, Offense, Claim or Suit** is deleted in its entirety and replaced by the following:

2. Duties in the Event of an Act, Error or Omission, or Claim or Suit

a. You must see to it that we are notified as soon as practicable of an act, error or omission which may result in a claim. To the extent possible, notice should include:

(1) What the act, error or omission was and when it occurred; and

(2) The names and addresses of anyone who may suffer damages as a result of the act, error or omission.

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ment-related practices, acts or omissions; or

(4) Consequential liability as a result of (1), (2) or (3) above.

This exclusion applies whether the insured may be held liable as an employer or in any other capacity and to any obligation to share damages with or repay someone else who must pay damages because of the injury.

(3) **Supplementary Payments**

SECTION I - COVERAGES, SUPPLEMENTARY PAYMENTS - COVERAGES A AND B also apply to this Coverage.

b. Who is an Insured

As respects Employee Benefit Liability Coverage, **SECTION II - WHO IS AN INSURED** is deleted in its entirety and replaced by the following:

(1) If you are designated in the Declarations as:

(a) An individual, you and your spouse are insureds, but only with respect to the conduct of a business of which you are the sole owner.

(b) A partnership or joint venture, you are an insured. Your members, your partners, and their spouses are also insureds but only with respect to the conduct of your business.

(c) A limited liability company, you are an insured. Your members are also insureds, but only with respect to the conduct of your business. Your managers are insureds, but only with respect to their duties as your managers.

(d) An organization other than a partnership, joint venture or limited liability company, you are an insured. Your "executive officers" and directors are insureds, but only with respect to their duties as your officers or directors. Your stockholders are also insureds, but only with respect to their liability as stockholders.

(e) A trust, you are an insured. Your trustees are also insureds, but only with respect to their duties as trustees.

(2) Each of the following is also an insured:

(a) Each of your "employees" who is or was authorized to administer your "employee benefit program".

(b) Any persons, organizations or "employees" having proper temporary authorization to administer your "employee benefit program" if you die, but only until your legal representative is appointed.

(c) Your legal representative if you die, but only with respect to duties as such. That representative will have all your rights and duties under this Coverage Part.

(3) Any organization you newly acquire or form, other than a partnership, joint venture or limited liability company, and over which you maintain ownership or majority interest, will qualify as a Named Insured if no other similar insurance applies to that organization. However, coverage under this provision:

(a) Is afforded only until the 180th day after you acquire or form the organization or the end of the policy period, whichever is earlier; and

(b) Does not apply to any act, error or omission that was committed before you acquired or formed the organization.

c. Limits of Insurance

As respects Employee Benefit Liability Coverage, **SECTION III - LIMITS OF INSURANCE** is deleted in its entirety and replaced by the following:

(1) The Limits of Insurance shown in Section **B. Limits of Insurance, 1. Employee Benefit Liability Coverage** and the rules below fix the most we will pay regardless of the number of:

(a) Insureds;

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i) Reports all, or any part, of the act, error or omission to us or any other insurer;

ii) Receives a written or verbal demand or claim for damages because of the act, error or omission; and

b) There is no other applicable insurance.

(2) Exclusions

This insurance does not apply to:

(a) Bodily Injury, Property Damage or Personal and Advertising Injury

"Bodily injury", "property damage" or "personal and advertising injury".

(b) Dishonest, Fraudulent, Criminal or Malicious Act

Damages arising out of any intentional, dishonest, fraudulent, criminal or malicious act, error or omission, committed by any insured, including the willful or reckless violation of any statute.

(c) Failure to Perform a Contract

Damages arising out of failure of performance of contract by any insurer.

(d) Insufficiency of Funds

Damages arising out of an insufficiency of funds to meet any obligations under any plan included in the "employee benefit program".

(e) Inadequacy of Performance of Investment / Advice Given With Respect to Participation

Any claim based upon:

1) Failure of any investment to perform;

2) Errors in providing information on past performance of investment vehicles; or

3) Advice given to any person with respect to that person's decision to participate or not to participate in any plan included in the "employee benefit program".

(f) Workers' Compensation and Similar Laws

Any claim arising out of your failure to comply with the mandatory provisions of any workers' compensation, unemployment compensation insurance, social security or disability benefits law or any similar law.

(g) ERISA

Damages for which any insured is liable because of liability imposed on a fiduciary by the Employee Retirement Income Security Act of 1974, as now or hereafter amended, or by any similar federal, state or local laws.

(h) Available Benefits

Any claim for benefits to the extent that such benefits are available, with reasonable effort and cooperation of the insured, from the applicable funds accrued or other collectible insurance.

(i) Taxes, Fines or Penalties

Taxes, fines or penalties, including those imposed under the Internal Revenue Code or any similar state or local law.

(j) Employment-Related Practices

Any liability arising out of any:

(1) Refusal to employ;

(2) Termination of employment;

(3) Coercion, demotion, evaluation, reassignment, discipline, defamation, harassment, humiliation, discrimination or other employ-

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6. **Voluntary Property Damage** (Coverage **a.**) **and Care, Custody or Control Liability Coverage** (Coverage **b.**)

Limits of Insurance (Each Occurrence)
Coverage **a.** $1,000
Coverage **b.** $5,000 unless otherwise stated $ _____

Deductibles (Each Occurrence)
Coverage **a.** $250
Coverage **b.** $250 unless otherwise stated $ _____

COVERAGE	PREMIUM BASIS (a) Area (b) Payroll (c) Gross Sales (d) Units (e) Other	RATE (For Limits in Excess of $5,000)	ADVANCE PREMIUM (For Limits in Excess of $5,000)
b. Care, Custody or Control			$
		TOTAL ANNUAL PREMIUM	$

11. **Property Damage to Borrowed Equipment**

Each Occurrence Limit: $ 10,000
Deductible: $ 250

C. Coverages:

1. **Employee Benefit Liability Coverage**

a. The following is added to **SECTION I - COVERAGES: Employee Benefit Liability Coverage.**

(1) Insuring Agreement

(a) We will pay those sums that the insured becomes legally obligated to pay as damages caused by any act, error or omission of the insured, or of any other person for whose acts the insured is legally liable, to which this insurance applies. We will have the right and duty to defend the insured against any "suit" seeking those damages. However, we will have no duty to defend against any "suit" seeking damages to which this insurance does not apply. We may, at our discretion, investigate any report of an act, error or omission and settle any claim or "suit" that may result. But:

1) The amount we will pay for damages is limited as described in **SECTION III - LIMITS OF INSURANCE**; and

2) Our right and duty to defend ends when we have used up the applicable limit of insurance in the payment of judgments or settlements.

No other obligation or liability to pay sums or perform acts or services is covered unless explicitly provided for under Supplementary Payments.

(b) This insurance applies to damages only if the act, error or omission, is negligently committed in the "administration" of your "employee benefit program"; and

1) Occurs during the policy period; or

2) Occurred prior to the effective date of this endorsement provided:

a) You did not have knowledge of a claim or "suit" on or before the effective date of this endorsement.

You will be deemed to have knowledge of a claim or "suit" when any "authorized representative";

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tional insured is more restrictive than was specifically required in that written contract or agreement, the terms of Paragraphs **9.a.(3)(a)**, **9.a.(3)(b)** or **9.b.** above, or any combination thereof, shall be interpreted as providing the limits or coverage required by the terms of the written contract or agreement, but only to the extent that such limits or coverage is included within the terms of the Coverage Part to which this endorsement is attached. If, however, the written contract or agreement specifies the Insurance Services Office additional insured form number **CG 20 10** but does not specify which edition, or specifies an edition that does not exist, Paragraphs **9.a.(3)(a)** and **9.a.(3)(b)** of this endorsement shall not apply and Paragraph **9.b.** of this endorsement shall apply.

10. Broadened Contractual Liability - Work Within 50' of Railroad Property

It is hereby agreed that Paragraph **f.(1)** of Definition **12.** "Insured contract" (**SECTION V - DEFINITIONS**) is deleted.

11. Property Damage to Borrowed Equipment

a. The following is hereby added to Exclusion **j. Damage to Property** of Paragraph **2., Exclusions** of **SECTION I - COVERAGES, COVERAGE A. BODILY INJURY AND PROPERTY DAMAGE LIABILITY**:

Paragraphs **(3)** and **(4)** of this exclusion do not apply to tools or equipment loaned to you, provided they are not being used to perform operations at the time of loss.

b. With respect to the insurance provided by this section of the endorsement, the following additional provisions apply:

(1) The Limits of insurance shown in the Declarations are replaced by the limits designated in Section **B. Limits of Insurance, 11.** of this endorsement with respect to coverage provided by this endorsement. These limits are inclusive of and not in addition to the limits being replaced. The Limits of Insurance shown in Section **B. Limits of Insurance, 11.** of this endorsement fix the most we will pay in any one "occurrence" regardless of the number of:

(a) Insureds;

(b) Claims made or "suits" brought; or

(c) Persons or organizations making claims or bring "suits".

(2) Deductible Clause

(a) Our obligation to pay damages on your behalf applies only to the amount of damages for each "occurrence" which are in excess of the Deductible amount stated in Section **B. Limits of Insurance, 11.** of this endorsement. The limits of insurance will not be reduced by the application of such Deductible amount.

(b) Condition **2. Duties in the Event of Occurrence, Offense, Claim or Suit**, applies to each claim or "suit" irrespective of the amount.

(c) We may pay any part or all of the deductible amount to effect settlement of any claim or "suit" and, upon notification of the action taken, you shall promptly reimburse us for such part of the deductible amount as has been paid by us.

12. Employees as Insureds - Specified Health Care Services

It is hereby agreed that Paragraph **2.a.(1)(d)** of **SECTION II - WHO IS AN INSURED**, does not apply to your "employees" who provide professional health care services on your behalf as duly licensed:

a. Nurses;

b. Emergency Medical Technicians; or

c. Paramedics,

in the jurisdiction where an "occurrence" or offense to which this insurance applies takes place.

13. Broadened Notice of Occurrence

Paragraph **a.** of Condition **2. Duties in the Event of Occurrence, Offense, Claim or Suit (SECTION IV - COMMERCIAL GENERAL LIABILITY CONDI-**

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TIONS) is hereby deleted and replaced by the following:

a. You must see to it that we are notified as soon as practicable of an "occurrence" or an offense which may result in a claim. To the extent possible, notice should include:

(1) How, when and where the "occurrence" or offense took place;

(2) The names and addresses of any injured persons and witnesses; and

(3) The nature and location of any injury or damage arising out of the "occurrence" or offense.

This requirement applies only when the "occurrence" or offense is known to an "authorized representative".

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THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

PRIMARY AND NONCONTRIBUTORY INSURANCE

This endorsement modifies insurance provided under the following:

BUSINESS AUTO COVERAGE FORM

This endorsement changes the policy effective on the inception date of the policy unless another date is indicated below.

Endorsement Effective:	Policy Number:
10-11-2017	EBA 034 72 45
Named Insured:	
HERRICK COMPANY INC	
Countersigned by:	
(Authorized Representative)	

With respect to coverage provided by this endorsement, the provisions of the Coverage Form apply unless modified by the endorsement.

1. **Noncontributory Insurance**

   SECTION IV - BUSINESS AUTO CONDITIONS, B. General Conditions, 5. Other Insurance is replaced by the following:

   c. Regardless of the provisions of Paragraph **a.** above, this Coverage Form's Liability Coverage is primary and we will not seek contribution from any other insurance for any liability assumed under an "insured contract" that requires liability to be assumed on a primary noncontributory basis.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

CANCELLATION OR NONRENEWAL BY US NOTIFICATION TO A DESIGNATED ENTITY

This endorsement modifies insurance provided under the following:

BUSINESSOWNERS PACKAGE POLICY
CLAIMS-MADE EXCESS LIABILITY COVERAGE PART
COMMERCIAL AUTO COVERAGE PART
COMMERCIAL GENERAL LIABILITY COVERAGE PART
COMMERCIAL UMBRELLA LIABILITY COVERAGE PART
DENTIST'S PACKAGE POLICY
EXCESS LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS COVERAGE PART
PROFESSIONAL LIABILITY COVERAGE PART
PROFESSIONAL UMBRELLA LIABILITY COVERAGE PART
PROFESSIONAL UMBRELLA LIABILITY COVERAGE PART - CLAIMS-MADE

SCHEDULE

Name and mailing address of person(s) or organization(s):
LFUCG
200 E MAIN ST
LEXINGTON, KY 40507-1310

Number of days notice (other than nonpayment of premium): 30

A. If we cancel or nonrenew this policy for any statutorily permitted reason other than nonpayment of premium we will mail notice to the person or organization shown in the Schedule. We will mail such notice at least the number of days shown in the Schedule before the effective date of cancellation or nonrenewal.

B. If we cancel this policy for nonpayment of premium, we will mail notice to the person or organization shown in the Schedule. We will mail such notice at least 10 days before the effective date of cancellation.

C. If notice is mailed, proof of mailing to the mailing address shown in the Schedule will be sufficient proof of notice.

D. In no event will coverage extend beyond the actual expiration, termination or cancellation of the policy.

Client#: 118984 41HERRICKCOM

ACORD™ CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 06/23/2018

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER J Smith Lanier & Co-Lexington Marsh & McLennan Agency, LLC P O Box 2030 Lexington, KY 40588	CONTACT NAME: Karen Marshall PHONE (A/C, No, Ext): 800 796-3667 FAX (A/C, No): 859 254-8020 E-MAIL ADDRESS:
INSURED Herrick Company, Inc. 1385 Tracy Road Lawrenceburg, KY 40342	INSURER(S) AFFORDING COVERAGE — NAIC # INSURER A : Cincinnati Insurance Co. — 10677 INSURER B : KY Assoc. General Contractors INSURER C : Travelers INSURER D : Philadelphia Ins Co's-Tokio Marine Spec INSURER E : INSURER F :

COVERAGES CERTIFICATE NUMBER: REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR X PD Ded:500 GEN'L AGGREGATE LIMIT APPLIES PER: POLICY PRO-JECT LOC OTHER:			EPP0347245	10/11/2017	10/11/2018	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$1,000,000 $500,000 $10,000 $1,000,000 $2,000,000 $2,000,000
A	AUTOMOBILE LIABILITY X ANY AUTO ALL OWNED AUTOS SCHEDULED AUTOS X HIRED AUTOS X NON-OWNED AUTOS X Drive Oth Car			EBA0347245	10/11/2017	10/11/2018	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$1,000,000 $ $ $
A	X UMBRELLA LIAB X OCCUR EXCESS LIAB CLAIMS-MADE DED X RETENTION $0			EPP0347245	10/11/2017	10/11/2018	EACH OCCURRENCE AGGREGATE	$5,000,000 $5,000,000
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y/N N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N/A		007033	01/01/2018	01/01/2019	X PER STATUTE OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$4,000,000 $4,000,000 $4,000,000
A	Builders Risk			EPP0347245	10/11/2017	10/11/2018	$3,000,000 - Limit $2,500 - Deductible	
C	Excess Umbr Liab			ZUP15T4005217NF	04/28/2018	10/11/2018	$5,000,000-Each Occ/Agg	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Coverages continued...
Pollution Liability
Insurer Letter: D
Policy Number: PPK1235310
Policy Term: 09/05/2016 - 09/05/2018
(See Attached Descriptions)

CERTIFICATE HOLDER

Strand Associates, Inc.
1525 Bull Lea Road, Suite 100
Lexington, KY 40511

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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KYM

DESCRIPTIONS (Continued from Page 1)

$2,000,000 - Each Occurrence
$6,000,000 - Aggregate
$5,000 - Deductible

PROJECT: West Hickman Wastewater Treatment Plant Scum Removal Addition and Aerated Sludge Holding Tank No. 3 Cover Project, Bid No. 22-2018
The Lexington-Fayette Urban County Government and Strand Associates, Inc. are included as additional insured when required by written contract but only with respects to the auto liability and general liability insurance including ongoing operations per CG2010 and products and completed operations hazard per CG2037 and subject to the provisions and limitations of the policy. The auto liability and general liability are written on a primary and non-contributory basis when required by written contract, subject to the provisions and limitations of the policy. The Umbrella policy is on a following form basis over the insuring conditions of the underlying scheduled Liability policies. A 30 Day notice of cancellation applies with a 14 day exception for non-payment, in favor of certificate holder when required by written contract, with respect to the general liability insurance and subject to the provisions and limitations of the policy. LFUCG and Strand Associates, Inc. are included as loss payee with respect to their interest in the Builder's Risk coverage and subject to the provisions and limitations of the policy

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED - DESIGNATED PERSON OR ORGANIZATION

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name of Person(s) or Organization(s):

Strand Associates, Inc.
325 W Main Street Ste 710
Louisville, KY 40202

Job Description:

The replacement of the septage receiving equipment and motorized valve, addition of rock trap, rock trap removal system, flow meter and hauler access station. Installation of a fiber optic cable and additional pavement.

COMMERCIAL GENERAL LIABILITY FORM, GA 101, is amended to add the following:

I. **SECTION II - WHO IS AN INSURED, 2.** is amended to add the following:

e. The person(s) or organization(s) shown in the Schedule are insureds, but only with respect to liability arising out of your ongoing operations or your completed operations or premises owned by or rented to you, and only with respects to liability arising out of:

(1) Operations performed for the additional insured by you at the job described in the Schedule; or

(2) Acts or failure to act by the additional insured in connection with general supervision, inspection, and coordination of your operations at the job described in the Schedule.

However, the additional insured shall not be considered to be insured for liability arising out the rendering of or failure to render "professional services".

II. **SECTION V – DEFINITIONS** is amended to add the following:

27. "Professional services" means engineer's services which are required to be licensed to perform such services by the state shown in the Job Description in the Schedule

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THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED BY CONTRACT

This endorsement modifies insurance provided under the following:

BUSINESS AUTO COVERAGE FORM
GARAGE COVERAGE FORM

This endorsement changes the policy effective on the inception date of the policy unless another date is indicated below.

Endorsement Effective:	Policy Number:
10-11-2017	**EBA 034 72 45**
Named Insured: **HERRICK COMPANY INC**	
Countersigned by: (Authorized Representative)	

With respect to coverage provided by this endorsement, the provisions of the Coverage Form apply unless modified by the endorsement.

SECTION II - LIABILITY COVERAGE, A. Coverage, 1. Who is an Insured is amended to include as an insured any person or organization with which you have agreed in a valid written contract to provide insurance as is afforded by this policy.

This provision is limited to the scope of the valid written contract.

This provision does not apply unless the valid written contract has been executed prior to the "bodily injury" or "property damage".

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

BLANKET WAIVER OF SUBROGATION - AUTO

This endorsement modifies insurance provided under the following:

BUSINESS AUTO COVERAGE FORM

This endorsement changes the policy effective on the inception date of the policy unless another date is indicated below.

Endorsement Effective:	Policy Number:
10-11-2017	EBA 034 72 45
Named Insured: HERRICK COMPANY INC	
Countersigned by: (Authorized Representative)	

With respect to coverage provided by this endorsement, the provisions of the Coverage Form apply unless modified by the endorsement.

1. **Blanket Waiver of Subrogation**

   SECTION IV - BUSINESS AUTO CONDITIONS, A. Loss Conditions, 5. Transfer of Rights of Recovery Against Others to Us is amended by the addition of the following:

   We waive any right of recovery we may have against any person or organization because of payments we make for "bodily injury" or "property damage" arising out of the operation of a covered "auto" when you have assumed liability for such "bodily injury" or "property damage" under an "insured contract", provided the "bodily injury" or "property damage" occurs subsequent to the execution of the "insured contract".

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

CANCELLATION OR NONRENEWAL BY US NOTIFICATION TO A DESIGNATED ENTITY

This endorsement modifies insurance provided under the following:

BUSINESSOWNERS PACKAGE POLICY
CLAIMS-MADE EXCESS LIABILITY COVERAGE PART
COMMERCIAL AUTO COVERAGE PART
COMMERCIAL GENERAL LIABILITY COVERAGE PART
COMMERCIAL UMBRELLA LIABILITY COVERAGE PART
DENTIST'S PACKAGE POLICY
EXCESS LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS COVERAGE PART
PROFESSIONAL LIABILITY COVERAGE PART
PROFESSIONAL UMBRELLA LIABILITY COVERAGE PART
PROFESSIONAL UMBRELLA LIABILITY COVERAGE PART - CLAIMS-MADE

SCHEDULE

Name and mailing address of person(s) or organization(s):
STRAND ASSOCIATES INC
1525 BULL LEA RD STE 100
LEXINGTON, KY 40511-1227

Number of days notice (other than nonpayment of premium): 30

A. If we cancel or nonrenew this policy for any statutorily permitted reason other than nonpayment of premium we will mail notice to the person or organization shown in the Schedule. We will mail such notice at least the number of days shown in the Schedule before the effective date of cancellation or nonrenewal.

B. If we cancel this policy for nonpayment of premium, we will mail notice to the person or organization shown in the Schedule. We will mail such notice at least 10 days before the effective date of cancellation.

C. If notice is mailed, proof of mailing to the mailing address shown in the Schedule will be sufficient proof of notice.

D. In no event will coverage extend beyond the actual expiration, termination or cancellation of the policy.

SECTION 01 11 00

SUMMARY OF WORK

PART 1–GENERAL

1.01 DIVISION ONE

A. The requirements of Division 01 apply to all sections of the Contract(s).

1.02 PROJECT SCOPE

A. CONTRACTOR shall provide all items, articles, materials, operations or methods mentioned or scheduled on the Drawings or herein specified: including all labor, supervision, equipment, incidentals, taxes, and permits necessary to complete the Work as described within the Contract Documents. CONTRACTOR shall install all items provided by OWNER as mentioned or scheduled on the Drawings or herein specified.

1.03 CONTRACT DOCUMENTS–INTENT AND USE

A. Intent of Documents:
   1. Singular notations and specifications shall be considered plural where application is reasonably inferred.
   2. Mention or indication of extent of work under any division or Specification section is done only for convenience of CONTRACTOR and shall not be construed as describing all work required under that division or section.
   3. Some individual sections may contain a list of related sections. The list of related sections in individual sections is provided for the convenience of CONTRACTOR and is not necessarily all-inclusive. CONTRACTOR may not rely upon this listing for determination of scope of work. Other sections of the Specifications not referenced in individual sections shall apply as required for proper performance of the Work.
   4. Command type sentences may be used in the Contract Documents. These sentences refer to and are directed to CONTRACTOR.
   5. Symbols for various elements and systems are shown on the Drawings. Should there be any doubt regarding the meaning or intent of the symbols used, a written interpretation shall be obtained from ENGINEER.

B. Use of Documents:
   1. CONTRACTOR shall examine all Specifications and Drawings for the Work, including those that may pertain to Work CONTRACTOR does not normally perform with its own forces.
   2. CONTRACTOR shall use all of the Project Drawings and Specifications:
      a. For a complete understanding of the Project.
      b. To determine the type of construction and systems required.
      c. For coordination with other contractors.
      d. To determine what other work may be involved in various parts or phases.
      e. To anticipate and notify others when work by others will be required.
      f. And all other relevant matters related to the project.
   3. CONTRACTOR is also bound by all requirements of the Contract Documents which are applicable to, pertain to, or affect its Work as may be shown or inferred by the entire set of Project Drawings and Specifications.

1.04 CONSTRUCTION REQUIREMENTS

A. General Information and Requirements:

1. Currently, wastewater treatment at the LFUCG West Hickman Wastewater Treatment Plant consists of influent pumping, screening, grit removal, biological phosphorus removal, activated sludge aeration followed by final clarification, chlorine disinfection, sulfur dioxide dechlorination, and post aeration of the final effluent. Sludge is aerated and dewatered for disposal at a landfill.
2. Wastewater treatment during construction must be continuous and the treatment efficiency must be equal to that achieved prior to the start of construction.
3. It shall be the responsibility of CONTRACTOR to not in any way impair the normal treatment or operating efficiency of the facilities, regardless of the work underway. No bypassing of raw or partially treated wastewater to receiving stream shall occur at any time as a result of construction. In general, this requires that new facilities be complete and ready for service or that temporary facilities be provided prior to removing existing units from service for modification or repair. CONTRACTOR shall provide all temporary piping, bypass pumping, and temporary construction required to complete the Work.
4. Operation of existing treatment facilities will be the responsibility of OWNER. CONTRACTOR shall cooperate with OWNER's staff at all times. A minimum of 48 hours prior to making any process or electrical connections to existing facilities or modification or demolition of existing facilities, CONTRACTOR shall notify OWNER in writing. At the time of notification, CONTRACTOR shall submit a schedule for completion of the Work, including a description of measures that will be taken to minimize the impact to existing facilities.
5. Except as specified, OWNER will drain existing tanks to the level of the lowest existing drain line or will remove tank contents using existing piping and pumping equipment. Subsequent cleaning or further draining and/or pumping shall be provided by CONTRACTOR. If there exists sludge, grit, or other residue that cannot be drained or pumped in its present state, it shall be the responsibility of CONTRACTOR to remove and dispose of this material.
6. Access: CONTRACTOR shall maintain roadways open at all times to meet OWNER's requirements, including access for sludge hauling vehicles and chemical deliveries. CONTRACTOR shall be responsible for maintaining roadways in drivable condition, including placement of temporary stone and gravel and providing drainage as necessary. All city-owned roadways around the treatment facility shall be cleaned of construction site materials, soil, and debris as necessary.

1.05 CONTRACTOR USE OF SITE

A. General:

1. The "area of the site" referred to in these Specifications shall be as shown on the Drawings. If the "area of the site" is not shown, OWNER's property lines shall be considered the "area of the site."
2. Construction activities shall be confined within the "area of the site" limits.
3. From the start of work to completion CONTRACTOR is responsible for the care of the site and the premises which are affected by operations of Work of this Contract.
4. Except for permanent site improvements provided under the Contract, CONTRACTOR shall restore property disturbed during the Work, to the conditions which previously existed.
5. Work in occupied spaces shall be restricted to specified Work and essential activities, such as making necessary connections and extending services or constructing temporary access ways. Such work shall be scheduled in advance with OWNER.

B. Parking and Deliveries:
   1. CONTRACTOR is responsible for control of traffic by vehicles and persons within the limits of its operations.
   2. Parking for employees, subcontractors, and agents of CONTRACTOR shall be in areas subject to approval of OWNER.
   3. Access to the site for delivery of construction material or equipment shall be subject to approval of OWNER.

1.06 EXISTING SERVICES, OVERHEAD UTILITIES, AND UNDERGROUND FACILITIES INCLUDING STRUCTURES

A. Interruption of existing services and systems including heating, ventilating, air conditioning, water, sanitary, lighting and power, signal and security systems, and similar work shall be kept to an absolute minimum and shall be limited to times approved by OWNER.

B. If deemed necessary by OWNER, such work shall be accomplished after OWNER's normal office hours.

C. Work shall not commence until all labor, materials, and equipment are available so Work can continue without interruption or delay.

D. Should uncharted or incorrectly charted services or Underground Facilities be encountered during installation, notify OWNER and consult with utility owner immediately.

E. Cooperate with OWNER and utility companies in keeping respective services and Underground Facilities in operation and repair any damage.

F. CONTRACTOR shall not interrupt existing services and Underground Facilities occupied and used by OWNER or others, except when permitted in writing by OWNER.

G. Any accidental interruption of services and Underground Facilities shall be repaired immediately, including provision of temporary facilities until permanent repairs can be made.

H. Prior to any excavation, demolition, or drilling on site, CONTRACTOR shall contact owners of the Underground Facilities in and near the construction area of the intent to excavate, demolish, or drill. As part of this notification requirement, CONTRACTOR shall contact the utility notification service Kentucky 811 (811 or 1-800-752-6007) at least two but not more than 10 business days in advance of any work. CONTRACTOR shall be aware that not all owners participate in Kentucky 811. A call to this agency shall not absolve CONTRACTOR of the requirements for contacting all owners of Underground Facilities in and near the construction area. CONTRACTOR shall give reasonable advance notice to Kentucky 811 and other owners–such notification shall not be less than the minimum advance notification required.

I. Locations and elevations of services and Underground Facilities as shown on the Drawings are approximate. It shall be CONTRACTOR's responsibility to determine their exact location when in their vicinity. To this end, CONTRACTOR shall proceed with caution in the excavation and preparation of the Site so the exact location of services and Underground Facilities can be determined. CONTRACTOR shall include in the Contract Price any costs for temporary or permanent relocations of such services and Underground Facilities required to complete the Work unless specifically indicated otherwise in the Specifications.

J. Where potential grade conflicts might occur with existing services and Underground Facilities, CONTRACTOR shall uncover such services and Underground Facilities sufficiently in advance of construction so that elevations may be determined to allow any necessary adjustments to be made.

K. CONTRACTOR shall coordinate with overhead utility companies prior to the Work. CONTRACTOR shall provide all necessary temporary and permanent support relocation or temporary and permanent restraint to maintain overhead utilities in service.

L. CONTRACTOR shall keep an accurate and complete record of all such services and Underground Facilities encountered and shall provide OWNER a copy of this record. The record shall include a description of the item encountered, opinion as to conditions, and adequate measurements and depths so that the item can be located in the future.

M. CONTRACTOR shall inspect all services and Underground Facilities for condition and soundness. Unsound conditions shall be reported to OWNER immediately after exposing. CONTRACTOR shall not proceed with the Work until the service or facility owner has been notified. Service or facility owner shall then be given time to inspect and correct, if required, the service or Underground Facility. CONTRACTOR may make claim under the provisions of Articles 10 and 11 of the General Conditions should CONTRACTOR feel a price or time adjustment is justified.

N. Any additional costs incurred because of failure of CONTRACTOR to report the condition of any and all existing services and Underground Facility encountered shall be paid for by CONTRACTOR.

O. Whenever ENGINEER feels it is necessary to explore and excavate to determine the location of existing services and Underground Facilities, CONTRACTOR shall make explorations and excavations for such purposes. If CONTRACTOR is required to perform additional Work in making the explorations and excavations, extra compensation will be allowed as provided for in the General Conditions.

1.07 PROTECTION OF WORK AND IMPROVEMENTS

A. CONTRACTOR shall protect the property of OWNER, existing improvements, and the Work installed by CONTRACTOR and others from abuse, damage, dust, debris, and other objectionable materials resulting from construction activities.

B. CONTRACTOR shall provide suitable covers, partitions, or other dust and fume containment devices to suit construction operations.

C. CONTRACTOR shall keep property, existing improvements, and the Work including structures, mains, fittings, and accessories free from dirt and foreign matter at all times.

D. CONTRACTOR shall provide temporary plugging of openings, holes, and pipe ends that are existing or that CONTRACTOR has installed.

E. Property, improvements, and Work damaged by CONTRACTOR shall be repaired or replaced by CONTRACTOR to the satisfaction of OWNER.

1.08 AVAILABILITY OF LANDS

A. CONTRACTOR shall confine its operations, equipment and storage areas to the lands and rights-of-way in which the Project is to be located. CONTRACTOR may enter into written agreements with property owners for use of other lands during construction. Copies of such agreements shall be provided to OWNER.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 29 00

CONTRACT CONSIDERATIONS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Cash allowances.
   2. Inspection and Testing Allowances.
   3. Measurement and Payment–Lump Sum.

1.02 CASH ALLOWANCES

A. See Paragraph 10.8 of the General Conditions for costs to be included in allowances.

B. Refer to sections of the specifications identified in the Bid Form for specific information on use of cash allowances.

C. The Bid shall include the amount equal to the specified quantity times the unit price.

1.03 INSPECTION AND TESTING ALLOWANCES

A. Costs Included in Inspection and Testing Allowances: Cost of engaging an inspection or testing firm; execution of inspection and tests; and reporting results.

B. Costs not to be included in Inspection and Testing Allowances but to be included in the Contract Price:
   1. Costs of incidental labor and facilities required to assist inspection or testing firm.
   2. Costs of testing laboratory services used by CONTRACTOR separate from Contract Document requirements.
   3. Costs of retesting upon failure of previous tests.
   4. Costs of tests specified to be provided by CONTRACTOR.

C. Payment Procedures: Submit one copy of the inspection or testing firm's invoice with next application for payment.

D. Refer to technical sections of specifications for required testing and any associated allowances.

1.04 MEASUREMENT AND PAYMENT–LUMP SUM

A. Payment for Lump Sum projects will be based on the accepted schedule of values for the project.

B. An acceptable schedule of values will include the following features:
   1. Schedule shall list the installed value of the component parts of the work in sufficient detail to serve as a basis for computing values for progress payments during construction. Schedule shall be subdivided as necessary by specification section and work area.

2. Identify each line item with the number and title of the respective Specification Section.
3. For each major line item list sub-values of major products or operations under the item.
4. For the various portions of the work:
   a. Each item shall include a directly proportional amount of CONTRACTOR's overhead and profit.
   b. For items on which progress payments will be requested for stored materials, break down the value into:
      (1) The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials upon request by ENGINEER.
      (2) The total installed value.
5. The sum of all values listed in the schedule shall equal the total Contract Sum.
6. Schedule shall include a separate listing of general items such as bonds, insurance, mobilization, demobilization, field supervision, and record documents.

C. Once a schedule of values is accepted, it shall not be revised, except for changes associated with subsequently executed change orders.

D. No separate measurement for payment will be performed for Lump Sum Work.

E. CONTRACTOR shall estimate percentage of Work completed. ENGINEER will review CONTRACTOR's estimate of quantity of Work completed.

F. Payment will be made based on the percentage of the Contract completed less retainage and/or liquidated damages.

G. Unless noted otherwise, all Work described in the Specifications and/or shown on the Drawings shall be included in the Lump Sum Bid.

H. Some technical specification sections may include payment provisions. These provisions are in addition to the provisions of this section which apply to all of the Work.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 31 00

COORDINATION, FIELD ENGINEERING, AND MEETINGS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Coordination.
   2. Field engineering.
   3. Progress meetings.
   4. Preinstallation meeting.

1.02 COORDINATION

A. CONTRACTOR shall coordinate scheduling, submittals, and work of the various sections of the work to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later. See Section 01 11 00–Summary of Work for specific construction sequence.

B. CONTRACTOR shall verify utility requirements and characteristics of operating equipment are compatible with building utilities and coordinate Work of various sections having interdependent responsibilities for installing, connecting to, and placing in service such equipment.

C. CONTRACTOR shall coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on the Drawings and shall follow routing shown for pipes, ducts, and conduit as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. In finished areas, except as otherwise indicated, CONTRACTOR shall conceal pipes, ducts, and wiring within the construction and coordinate locations of fixtures and outlets with finish elements.

E. CONTRACTOR shall coordinate completion and cleanup of Work of separate sections in preparation for substantial completion and for portions of Work designated for OWNER's occupancy.

F. After OWNER occupancy of premises, CONTRACTOR shall coordinate access to Site for correction of defective Work and Work not in accordance with Contract Documents to minimize disruption of OWNER's activities.

1.03 FIELD ENGINEERING

A. CONTRACTOR shall locate and protect property stakes, legal survey monuments, benchmarks, and survey control and reference points. CONTRACTOR shall pay for replacement of disturbed property stakes and legal survey monuments by a Registered Land Surveyor acceptable to OWNER and for replacement of benchmarks and survey control and reference points provided by ENGINEER.

B. CONTRACTOR shall provide field engineering services as required to establish elevations, lines, and levels utilizing recognized engineering survey practices.

C. CONTRACTOR shall furnish all required plummets and graduated poles to check all Work.

D. If stakes and boards have to be reset because of negligence of CONTRACTOR, CONTRACTOR shall bear the cost of such work.

E. If laser beam is used, CONTRACTOR shall check its Work against intermediate grade stakes provided between manholes. Prior to initial use of the laser, CONTRACTOR shall set up laser on ground surface and check line and gradient controls. Lasers not functioning properly shall be immediately removed.

F. If existing property stakes not within the limits of the trench are removed or damaged by CONTRACTOR, CONTRACTOR shall bear the cost of replacement. Replacement shall be made by a legal survey performed by a licensed Land Surveyor hired by OWNER. Cost for survey shall be deducted from the Contract Price.

G. CONTRACTOR shall be responsible for all lines, elevations, and measurements of buildings, structures, piping, utilities, and other work executed by CONTRACTOR under the Contract. CONTRACTOR must exercise proper precaution to verify figures before laying out the Work and will be held responsible for any error resulting from its failure to exercise such precaution.

H. See Specifications for additional requirements concerning layout of the Work.

1.04 PROGRESS MEETINGS

A. Progress meetings will be held throughout progress of the Work at intervals agreed to by OWNER, ENGINEER, and CONTRACTOR. Interval will generally be monthly.

B. CONTRACTOR's project manager, job superintendent, major subcontractors, and suppliers shall attend as appropriate to address agenda topics for each meeting. CONTRACTOR's representatives shall have authority to bind CONTRACTOR to decisions at the meetings.

C. The project schedule shall be updated monthly and shall be reviewed at each progress meeting. CONTRACTOR shall provide the following information in written form at each meeting.
   1. Construction progress, including:
      a. Activities completed this reporting period.
      b. Activities in progress this reporting period.
      c. Activities scheduled to commence this reporting period.
   2. Description of problem areas.
   3. Current and anticipated delays.
      a. Cause of the delay.
      b. Corrective action and schedule adjustments to correct the delay.
      c. Impact of the delay on other activities, on milestones, and on completion dates.
   4. Changes in construction sequence.

D. ENGINEER will prepare and distribute minutes to all attending parties.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 33 00

SUBMITTALS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Whenever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined either by manufacturer's name and catalog number or by reference to recognized industry standards.
   2. To facilitate CONTRACTOR's understanding of the design intent, procedures have been established for advance submittal of design data and for its review or rejection by ENGINEER.
   3. The type of submittal requirements specified in this section include construction progress schedule, submittal schedule, shop drawings, product data, samples, maintenance manuals, and other miscellaneous work-related submittals.

B. Related work described elsewhere: More detailed requirements for submittals are described in other sections of these specifications for some materials and equipment. They are to be considered additional requirements to supplement the requirements specified in this section. Submittals shall conform to Article 7 of the General Conditions.

C. Definitions: "Electronic Submittal" is defined as any submittal transmitted electronically to ENGINEER for review.

1.02 IDENTIFICATION OF SUBMITTALS

A. CONTRACTOR shall completely identify each submittal and resubmittal by showing at least the following information:
   1. Name and address of submitter, plus name and telephone number of the individual who may be contacted for further information.
   2. Name and location of project and identification number.
   3. Drawing number and specifications section number to which the submittal applies.
   4. Include the date of each submittal or resubmittal.

1.03 GROUPING OF SUBMITTALS

A. Unless otherwise specifically permitted by ENGINEER, CONTRACTOR shall make all submittals in groups containing all associated items so that information is available for checking each item when it is received.

B. Partial submittals may be rejected as not complying with the provisions of the Contract Documents.

1.04 TIMING OF SUBMITTALS

A. CONTRACTOR shall make all submittals far enough in advance of scheduled dates of installation to provide required time for reviews, for securing necessary approval, for possible revision and resubmittal, and for placing orders and securing delivery.

B. The review period for submittals that are received after 3 P.M. shall commence on the following business day.

1.05 CONSTRUCTION PROGRESS AND SUBMITTAL SCHEDULES

A. Submit preliminary schedules within 10 days of the effective date of the Agreement.

B. Revise schedules incorporating any comments provided at the schedule review conference required in GC.2.8 and resubmit.

C. As a minimum, the construction progress schedule shall consist of a horizontal bar chart with a separate line for each major portion of Work or operation, identifying first workday of each week.

D. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration for each activity. Identify activities that are on the critical path.

E. Include line items for milestones (if any), Substantial, and Final Completion.

F. Submit updated schedules with each Application for Payment, identifying changes since previous version.

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

H. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates.

1.06 SHOP DRAWINGS

A. Shop drawings shall include specially prepared technical data for this project including drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements, and similar information not in standard printed form for general application to a range of similar projects. Shop drawings shall be submitted for all manufactured or fabricated items. See individual technical sections for special requirements.

B. CONTRACTOR shall make all shop drawings accurately to scale and sufficiently large to show all pertinent aspects of the item and its method of connection to the work.

C. Shop drawings shall be checked, approved, and stamped by CONTRACTOR in accordance with the General Conditions before transmittal to ENGINEER for review and approval.

D. Complete shop drawings and descriptive data shall be submitted on all manufactured or fabricated items prior to 50% completion of the Work. Applications for payment beyond 50% of the Contract amount will not be recommended for payment until all shop drawings are submitted, including the required hard copies, or a revised schedule for any remaining submittals is agreed to by OWNER and ENGINEER.

E. CONTRACTOR shall submit shop drawings following the electronic submittal procedure described below. If electronic submittal is impossible, CONTRACTOR may request ENGINEER to review hard copy submittals on a limited basis. ENGINEER may request to review hard copy submittals on a limited basis for submittals that are over 100 pages in

length. If ENGINEER agrees to or requests hard copy submittal review, CONTRACTOR shall submit seven color copies of shop drawings and descriptive data to ENGINEER for approval. Three copies of these will be returned to CONTRACTOR if approved. If shop drawings are not approved or if they are stamped "Approved as Noted-Resubmit," two corrected copies will be returned to CONTRACTOR for use in resubmittal. If CONTRACTOR desires more than three approved copies, submitted quantity shall be increased accordingly.

F. Hard copy shop drawings shall be submitted in 3-ring binders or 3-tab report covers.

G. Shop drawings submitted to ENGINEER will be reviewed and stamped "Approved," "Approved as Noted," "Approved as Noted-Resubmit," or "Not Approved." CONTRACTOR shall resubmit the above number of corrected shop drawings for all shop drawings stamped "Approved as Noted-Resubmit" and "Not Approved" and will continue this process until shop drawings are stamped "Approved" or "Approved as Noted." If drawings are stamped "Approved as Noted-Resubmit," fabrication may proceed in accordance with the marked-up shop drawings. Installation shall not proceed until shop drawings have been resubmitted and stamped "Approved" or "Approved as Noted."

H. If shop drawings are stamped "Approved as Noted" or "Approved as Noted-Resubmit" and CONTRACTOR does not agree with revisions or cannot conform with revisions, fabrication shall not proceed and shop drawings shall be resubmitted with explanation of CONTRACTOR's position.

I. All shop drawings used for construction site activities shall bear the "Approved" or "Approved as Noted" stamp of ENGINEER.

J. Arrangements may be made between CONTRACTOR and ENGINEER to provide additional copies of "Approved" shop drawings for field activity purposes.

K. Electronic Submittal Procedures:
   1. Summary:
      a. Shop drawing and product data submittals shall be transmitted to ENGINEER in electronic (PDF) format using Submittal Exchange, or equal, a website service designed specifically for transmitting submittals between construction team members, or equal.
      b. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.
      c. The electronic submittal process is not intended for color samples, color charts, or physical material samples.
   2. Procedures:
      a. CONTRACTOR shall review and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer/product, dimensions and coordination of information with other parts of the work.
      b. CONTRACTOR shall transmit each submittal to ENGINEER using the Submittal Exchange website, www.submittalexchange.com, or equal.
      c. ENGINEER review comments will be made available on the Submittal Exchange website for downloading. CONTRACTOR will receive email notice of completed review.
      d. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of CONTRACTOR.
      e. Electronically submitted shop drawings shall follow the following format:

(1) Filenames for the shop drawing submittals shall follow a XX XX XX.YYY-Z. Description convention where XX XX XX is the specification section number, YYY is the submittal number, .Z is the resubmittal number, and description is a short description of what the submittal includes. Submittals shall be consecutively numbered in direct sequence of submittal. Resubmittals shall be consecutively numbered with the first submittal numbered with an -0 and the first resubmittal numbered with a -1.
   (a) Example file name: 03 20 00.016-1. Structure 10 Concrete Reinforcement. This would be the first revision of the sixteenth submittal and contain information on concrete reinforcement.
(2) All files shall be delivered in PDF format with a minimum resolution of 300 dpi unless otherwise requested by ENGINEER. Scanned in material shall be scanned in color and any markings by CONTRACTOR shall be made in red. Pages shall be rotated to the appropriate position for easy reading on a computer monitor such that the majority of text is vertical.
(3) Files shall be delivered without security features activated.
(4) Shop Drawings shall be uploaded as individual files. Files combined into a zip drive are not acceptable. All pages of one submittal should be contained in one file.
(5) The file shall open to a cover page containing, at a minimum, the following information:
   (a) CONTRACTOR's stamp.
   (b) Name, e-mail, and telephone number of the individual who may be contacted for further information.
   (c) Project number.
   (d) Submittal number.
   (e) Submission date, if resubmittal, all previous submission dates.
   (f) Index detailing contents and the total number of pages in the submittal.

f. Once a shop drawing has been "Approved" or "Approved as Noted," CONTRACTOR shall provide three hard color copies of the "Approved" or "Approved as Noted," shop drawings to ENGINEER. CONTRACTOR is responsible for the hard copy color replication of ENGINEER's "Approved" or "Approved as Noted," shop drawings for use by CONTRACTOR. Hard copy shop drawings shall be submitted in 3-ring binders or 3-tab report covers.

3. Costs:
   a. CONTRACTOR shall include the full cost of Submittal Exchange, or equal, project subscription in their proposal. This cost shall be included in the Contract amount. Contact Submittal Exchange at 1-800-714-0024 to verify cost prior to Bid.
   b. At CONTRACTOR's option, training is available from Submittal Exchange regarding use of website and PDF submittals. Contact Submittal Exchange at 1-800-714-0024.
   c. Internet Service and Equipment Requirements:
      (1) Email address and Internet access at CONTRACTOR's main office.
      (2) Adobe Acrobat (www.adobe.com), Bluebeam PDF Revu (www.bluebeam.com), or other similar PDF review software for applying electronic stamps and comments.

L. CONTRACTOR is fully responsible for obtaining any and all copyright permission associated with conversion of shop drawing information to electronic format.

1.07 COLORS AND PATTERNS

A. Unless the precise color and pattern is specifically described in the Contract Documents, whenever a choice of color or pattern is available in a specified product, CONTRACTOR shall submit accurate color charts and pattern charts to ENGINEER for OWNER's review and selection.

B. Unless all available colors and patterns have identical wearing capabilities and are identically suited for the installation, CONTRACTOR shall completely describe the relative capabilities of each.

1.08 SAMPLES AND FIELD MOCKUPS

A. CONTRACTOR shall provide samples and field mockups where noted or specified.

B. Samples are physical examples which illustrate materials, equipment, or workmanship and establish standards by which the work will be judged.

C. Samples shall be of sufficient size and quantity to clearly illustrate the functional characteristics of the product and full range of color, texture, and pattern.

D. Samples shall have labels firmly attached, bearing the following information:
   1. Name of project.
   2. Description of product and finish.
   3. Name of CONTRACTOR.
   4. Trade name and number of product.
   5. Standards met by the product.

E. Approval of samples must be obtained prior to proceeding with any work affected by material requiring sample approval.

F. Samples, unless otherwise noted, become the property of OWNER.

G. In situations specifically approved by ENGINEER, the retained sample may be used in the construction as one of the installed items.

H. Field Mockups:
   1. CONTRACTOR shall erect field mockups at the project site in a location acceptable to ENGINEER and OWNER.
   2. When accepted by ENGINEER, the mockup will become the basis for comparison of the actual work.
   3. Remove mockup at conclusion of the work if it was not incorporated into the work.

1.09 PRODUCT DATA

A. CONTRACTOR shall provide product data as required to supplement shop drawings.

B. Product data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by CONTRACTOR to illustrate a material, product, or system for some portion of the work.

C. CONTRACTOR shall collect required product data into one submittal for each unit of work or system.

D. CONTRACTOR shall include manufacturer's standard printed recommendations for application and use, compliance with standards, performance characteristics, wiring and piping diagrams and controls, component parts, finishes, dimensions, required clearances, and other special coordination requirements.

E. CONTRACTOR shall mark each copy of standard printed data to identify pertinent products, models, options, and other data.

F. CONTRACTOR shall supplement manufacturer's standard data to provide information unique to the work.

1.10 RESUBMISSION REQUIREMENTS

A. Make any corrections or changes in the submittals required by ENGINEER.

B. Shop Drawings and Product Data:
   1. Revise initial drawings or data and resubmit as specified for initial submittal.
   2. Itemize in a cover letter any changes which have been made other than those requested by ENGINEER.

C. Electronic shop drawing resubmissions shall follow the nomenclature described in Section 1.06.L.2.e.

1.11 MANUFACTURER'S DIRECTIONS

A. Manufactured articles, materials, and equipment shall be stored, commissioned, operated, applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer, unless specified to the contrary.

B. Wherever specifications call for work to be performed or materials to be installed in accordance with the manufacturer's printed instructions or directions, CONTRACTOR shall furnish copies as required for shop drawings of those instructions or directions to ENGINEER before installing the material or performing the work.

1.12 MAINTENANCE MANUAL

A. Prior to 75% completion of the Contract or at a minimum of 45 days prior to the scheduled start-up date of any individual item of equipment, whichever is earlier, CONTRACTOR shall furnish to ENGINEER four complete copies of a maintenance manual for all equipment furnished and an electronic format compact disk of the maintenance manual in the most recent version of Adobe (.pdf) format identical to the hard copy. Applications for payment beyond 75% of the contract amount will not be recommended for payment until all maintenance manuals are submitted or a revised schedule for remaining maintenance manuals is agreed to by OWNER and ENGINEER.

B. CONTRACTOR is responsible for producing an electronic version of the Equipment Operations and Maintenance (O&M) Manuals Manual. The Electronic Equipment O&M Manual shall be delivered in Portable Document Format (PDF). The entire manual may be converted to PDF via scanning or other method of conversion. Drawings or other graphics must be converted to PDF format and made part of the PDF document. The CONTRACTOR shall provide all Equipment O&M Manuals in the electronic format as defined below.

C. The filename for the Equipment O&M Manual submittal will be provided with the request for final Equipment O&M Manuals. Filenames use the "eight dot three" convention (XX XX XX_YY.PDF) where XX XX XX is the specification section number and YY is an ID number. No one file shall be larger than 10 MB. If technical problems require that the submittal be divided into more than one file, a letter extension shall be added to the end of each filename.

D. (Example: 19876_01a.pdf). The number of files shall be kept to a minimum. Equipment O&M Manuals that span more than one file shall have the final Bookmark "Return to Table of Contents" which shall take the User to the first file on the Equipment O&M Manual.

E. All text (word processed), spreadsheets, and electronic graphics shall be delivered in portable document format (*.PDF). The resolution of all scanned images shall be a minimum of 300 dpi unless otherwise requested by ENGINEER. Scanned images shall be processed with the "original image with hidden text" option (Adobe Acrobat 6 or higher). This results in a clear image and provides for optical character recognition (OCR) and word search functionality. Graphical files shall be fully searchable. All submittals must be indexed with the Adobe Catalog feature. Placement and structure of index files shall be in accordance with Adobe's recommendations to minimize problems when transferring files. Successful searches for words or strings in the PDF document shall demonstrate proof of OCR.

F. Rotate pages viewed in landscape to the appropriate position for easy reading on a computer monitor.

G. Bookmarks shall be created in the navigation frame for each entry in the Table of Contents. Three levels deep is usually enough (i.e., "Chapter", "Section", "Subsection"); however, complex submittals like instrumentation and electrical may be required at the discretion of ENGINEER. When setting bookmarks for Chapter level heading, the page shall be displayed at Full Page. Section and Subsection level heading pages shall be displayed as a magnified view. Bookmarks shall be displayed as subordinate (to other bookmarks in their hierarchy set so that only the Chapter level headings are displayed.

H. Thumbnails shall be generated and embedded in each PDF file.

I. Files shall be delivered without Security features activated. Password protected files will be unacceptable.

J. The opening view for PDF files shall be set as follows:
   1. Initial View: Bookmarks and Page
   2. Magnification: Fit In Window
   3. Page Layout: Single Page

K. The file shall open to the cover page of the Equipment O&M Manual with bookmarks to the left. The first bookmark shall be the name of Equipment O&M Manual.

L. The submittal shall be delivered on CD after all Equipment O&M Manuals have been received and reviewed. Each CD shall be labeled, at a minimum, as follows, including: 1) CD-ROM disks, 2) jewel cases, and 3) hard copies.

M. Manufacturer name, point of contact, telephone number, facsimile number, and e-mail address as appropriate.

N. Equipment name and/or O&M title spelled out in complete words.

Example "Operations and Maintenance Manual"
"Horizontal Centrifugal Nonclog Pump"

O. Specifications section number.

P. Project name.

Q. Date and File Name: Example "12-20-07," "19876_01.pdf."

R. CONTRACTOR shall reprocess any portion of the document that does not view or print to OWNER's satisfaction.

S. CONTRACTOR is fully responsible for obtaining any and all copyright permissions associated with conversion of this information to electronic format.

T. The manuals shall include manufacturer's instructions for maintenance and operation for each item of mechanical and electrical equipment. Manuals shall be specific for the equipment as installed; provide project specific inserts as required. Manuals shall contain: operation instructions, lubrication schedules, types and quantities, preventive maintenance program, spare parts list, parts lists, I.D. No. and exploded views, assembly instructions, parts supplier location, trouble shooting and start-up procedures and, where applicable, test data and curves. All sheets shall have reduced dimensions as described for shop Drawings. All sheets shall be furnished in 3-ring binders or 3-tab report covers.

U. Each maintenance manual shall include a completed equipment maintenance summary form for each type and size of equipment being furnished that requires power, lubrication, or maintenance. Equipment Summary forms are located at the end of this section.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
1. OSHA requirements.
2. Roadway limits.
3. Permits.
4. Wage rates.
5. Recording and preserving historical and archaeological finds.

1.02 OSHA REQUIREMENTS

A. All work including site safety, equipment, materials, and fabricated items provided under the Contract shall comply with the provisions of the "Occupational Safety and Health Act" (OSHA), the Kentucky Occupational Safety and Health Act (KYOSH), the Lexington-Fayette Urban County Government and all other applicable federal, state, county and local laws, ordinances, codes, the requirements set forth herein, and any regulations that may be specified in other parts of these Contract Documents. Where any of these are in conflict, the more stringent requirements shall be followed.

B. The CONTRACTOR's failure to thoroughly familiarize itself with the aforementioned safety provisions shall not relieve CONTRACTOR from compliance with the obligations and penalties set forth therein.

1.03 ROADWAY LIMITS

A. CONTRACTOR shall comply with roadway weight restrictions including seasonal weight restrictions.

1.04 PERMITS

A. The following permits were obtained by OWNER:
1. Kentucky Division of Water Construction Permit. (Permit is pending from KDOW).
2. Building Permit. (Permit is pending from HBC).

B. A building permit will be required from OWNER. However, OWNER will waive fees associated with the permit.

1.05 WAGE RATES

A. A state wage rate determination is not a requirement of this project.

1.06 RECORDING AND PRESERVING HISTORICAL AND ARCHAEOLOGICAL FINDS

A. In the event archaeological materials (arrowheads, stone tools, stone axes, prehistoric and historic pottery, bottles, foundations, Civil War artifacts, and other types of artifacts) are

uncovered during the construction of the Project, Work is to immediately cease at the location and the Kentucky Heritage Council shall be contacted. The telephone number is (502) 564-7005. Construction shall not commence at this location until a written release is received from the Kentucky Heritage Council. Failure to report a find could result in legal action.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 42 00

REFERENCE STANDARDS AND DEFINITIONS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Reference Standards:
      a. Throughout the Contract Documents, reference is made to codes and standards which establish qualities and types of workmanship and materials, and which establish methods for workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics.
      b. Where materials or workmanship are required by these Contract Documents to meet or exceed the specifically named code or standard, it is CONTRACTOR's responsibility to provide materials and workmanship which meet or exceed that specifically named code or standard.
      c. It is also CONTRACTOR's responsibility, when so required by the Contract Documents, to deliver to ENGINEER all required proof that the material or workmanship, or both, meet or exceed the requirements of the specifically named code or standard.
   2. Definitions:
      a. A substantial amount of specification language constitutes definitions for terms found in other Contract Documents, including the Drawings which must be recognized as diagrammatic in nature and not completely descriptive of requirements indicated thereon.
      b. Certain terms used in the Contract Documents are defined generally in this section to supplement definitions of the Agreement, General Conditions, Supplementary Conditions, and other general contract documents.
      c. Definitions and explanations of this section are not necessarily either complete or exclusive, but are general for the Work.

B. Related Work Described Elsewhere: The specific naming of codes or standards occurs on the Drawings and in other sections of these Specifications.

1.02 QUALITY ASSURANCE

A. Familiarity with Pertinent Codes and Standards:
   1. It is CONTRACTOR's responsibility to verify the requirements of the specifically named codes and standards and to verify that the items procured for use in this Work meet or exceed the specified requirements.
   2. When required by individual sections of these specifications, CONTRACTOR shall obtain a copy of each pertinent code or standard and maintain the copies at the job site during submittals, planning, and progress of the Work until Substantial Completion of the Work is attained.

B. Overlapping or Conflicting Requirements:
   1. Where compliance with two or more industry standards or sets of requirements are specified, and the overlapping of those standards or requirements establishes different or conflicting minimums or levels of quality, the most stringent requirement (which is

generally recognized to be also most costly) is intended and will be enforced, unless more detailed language written directly into Contract Documents clearly indicates that a less stringent requirement is acceptable.

2. Refer all uncertainties to ENGINEER for decision before proceeding.

1.03 REFERENCE STANDARDS

A. Applicable standards of the construction industry are made a part of the Contract Documents by reference as if copied directly into the Contract Documents, or as if published copies were bound herewith. See Article 3.02 of the General Conditions for additional provisions regarding references.

B. Standards referenced directly in the Contract Documents or by governing regulation, have precedence over nonreferenced standards which are recognized in industry for applicability to the Work.

C. Nonreference standards are hereby defined to have no particular applicability to the work except as a general measurement of whether the Work complies with standards recognized in the construction industry.

D. Reference standards and codes listed in these specifications may include, but are not necessarily limited to, standards or codes published by the following agencies and organizations:

1. AA — Aluminum Association
1525 Wilson Boulevard, Arlington, VA 22209

2. AAMA — American Architectural Manufacturer's Association
1827 Walden Office Square Suite 550, Schaumberg, IL 60173-4268

3. AASHTO — American Association of State Highway & Transportation Officials
444 North Capitol Street NW Suite 249, Washington, DC 20001

4. ACI — American Concrete Institute
38800 Country Club Drive, Farmington Hills, MI 48331-3439

5. AI — Asphalt Institute
2696 Research Park Drive, Lexington, KY 40511-8480

6. AISC — American Institute of Steel Construction
One East Wacker Drive Suite 700, Chicago, IL 60601-1802

7. AISI — American Iron and Steel Institute
25 Massachusetts Avenue NW Suite 800, Washington, DC 20001

8. ANSI — American National Standards Institute
25 West 43rd Street, New York, NY 10036

9. APA — American Plywood Association
7011 South 19th, Tacoma, WA 98466-5333

10. API	American Petroleum Institute 1220 L Street NW, Washington, DC 20005-4070
11. ARI	Air-Conditioning & Refrigeration Institute 4100 North Fairfax Drive Suite 200, Arlington, VA 22203
12. ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers 1791 Tullie Circle NE, Atlanta, GA 30329
13. ASME	American Society of Mechanical Engineers Two Park Avenue, New York, NY 10016-5990
14. ASSE	American Society of Sanitary Engineering 901 Canterbury Suite A, Westlake, OH 44145
15. ASTM	ASTM International 100 Barr Harbor Drive, West Conshohoken, PA 19428-2959
16. AWI	Architectural Woodwork Institute 46179 Westlake Drive Suite 120, Potomac Falls, VA 20165-5874
17. AWPA	American Wood Protection Association P.O. Box 361784, Birmingham, AL 35236-1784
18. AWS	American Welding Society 8669 Doral Boulevard Suite 130, Doral, FL 33166
19. AWWA	American Water Works Association 6666 West Quincy Avenue, Denver, CO 80235
20. BHMA	Builder's Hardware Manufacturers Association 355 Lexington Avenue 15th floor, New York, NY 10017
21. BIA	Brick Industry Association 1850 Centennial Park Drive Suite 301, Reston, VA 20191
22. CRSI	Concrete Reinforcing Steel Institute 9333 North Plum Grove Road, Schaumburg, IL 60173
23. EJMA	Expansion Joint Manufacturers Association 25 North Broadway, Tarrytown, NY 10591
24. FM	FM Global FM Global Corporate Offices, 270 Central Avenue, Johnston, RI 02919
25. FTI	Facing Tile Institute Box 8880, Canton, OH 44711

26. GA	Gypsum Association 6525 Belcrest Road Suite 480, Hyattsville, MD 20782
27. GANA	Glass Association of North America 800 SW Jackson Street Suite 1500, Topeka, KS 66612-1200
28. ICC	International Code Council 500 New Jersey Avenue NW 6th Floor, Washington, DC 20001
29. IES	Illuminating Engineering Society 120 Wall Street, Floor 17, New York, NY 10005-4001
30. MIL	Military Specifications Naval Publications and Forms Center 5801 Tabor Avenue, Philadelphia, PA 19120
31. NAAMM	National Association of Architectural Metal Manufacturers 800 Roosevelt Road Building C Suite 312, Glen Ellyn, IL 60137
32. NCMA	National Concrete Masonry Association 13750 Sunrise Valley Drive, Herndon, VA 20171-4662
33. NECA	NECA National Electrical Contractors Association 3 Bethesda Metro Center Suite 1100, Bethesda, MD 20814
34. NEMA	National Electrical Manufacturers Association 1300 North 17th Street Suite 1752, Rosslyn, VA 22209
35. NFPA	National Fire Protection Association 1 Batterymarch Park, Quincy, MA 02169-7471
36. NIST	National Institute of Standards and Technology (U.S. Department of Commerce), 100 Bureau Drive, Stop 1070 Gaithersburg, MD 20899-1070
37. NRCA	National Roofing Contractors Association 10255 West Higgins Road Suite 600, Rosemont, IL 60018-5607
38. NSF	National Sanitation Foundation International P.O. Box 130140, 789 North Dixboro Road, Ann Arbor, MI 48113-0140
39. OSHA	Occupational Safety & Health Administration 200 Constitution Avenue NW, Washington, DC 20210
40. PCA	Portland Cement Association 5420 Old Orchard Road, Skokie, IL 60077
41. PCI	Prestressed Concrete Institute 200 West Adams Street Suite 2100, Chicago, IL 60606

42. SAE — Society of Automotive Engineers
SAE World Headquarters
400 Commonwealth Drive, Warrendale, PA 15096-0001

43. SDI — Steel Deck Institute
P.O. Box 25, Fox River Grove, IL 60021

44. SDI — Steel Door Institute
30200 Detroit Road, Westlake, OH 44145-1987

45. SIGMA — Sealed Insulating Glass Manufacturers Assoc.
401 North Michigan Avenue Suite 2400, Chicago, IL 60611

46. SJI — Steel Joist Institute
234 Cheves Street, Florence, SC 29501

47. SMACNA — Sheet Metal and Air Conditioning
Contractor's National Association
4201 Lafayette Center Drive, Chantilly, VA 20151-1219

48. SSPC — Society for Protective Coatings
40 24th Street 6th Floor, Pittsburgh, PA 15222-4656

49. TCA — Tile Council of America
100 Clemson Research Boulevard, Anderson, SC 29625

50. UL — Underwriters Laboratories
333 Pfingston Road; Northbrook, IL 60062

1.04 SUBMITTALS

A. For OWNER's records, CONTRACTOR shall submit copies of permits, licenses, certifications, inspection reports, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

1.05 DEFINITIONS

A. Indicated:
1. The term "indicated" is a cross-reference to details, notes, or schedules on the drawings, to other paragraphs or schedules in the specifications and to similar means of recording requirements in the Contract Documents.
2. Where terms such as "shown," "noted," "scheduled," and "specified" are used in lieu of "indicated", it is for the purpose of helping the reader locate cross-reference, and no limitation is intended except as specifically noted.

B. Approve (or Words of Similar Nature):
1. Where used in conjunction with ENGINEER's response to submittals, requests, applications, inquiries, reports, and claims by CONTRACTOR, the meaning of the term "approve" will be held to the limitation of ENGINEER's responsibilities and duties as specified in Paragraph 1.02.B.1. of the General Conditions.

2. In no case will "approval" by ENGINEER be interpreted as a release of CONTRACTOR from responsibility to fulfill requirements of the Contract Documents.

C. Minimum Requirements:
   1. Indicated requirements are for a specific minimum acceptable level of quality or quantity, as recognized in the industry.
   2. Actual work must comply with (or within specified tolerances) or exceed minimums.
   3. CONTRACTOR shall refer uncertainties to ENGINEER before proceeding.

D. Abbreviations: Abbreviations, where not defined in the Contract Documents, will be interpreted to mean the normal construction industry terminology.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 45 00

QUALITY CONTROL

PART 1–GENERAL

1.01 SUMMARY

A. Work Includes:
   1. Quality Assurance–Control of Installation.
   2. Tolerances.
   3. Manufacturers' Field Services and Reports.

1.02 QUALITY ASSURANCE–CONTROL OF INSTALLATION

A. CONTRACTOR shall monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to produce Work of specified quality.

B. CONTRACTOR shall comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, CONTRACTOR shall request clarification from ENGINEER before proceeding.

D. CONTRACTOR shall comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Work shall be performed by persons qualified to produce workmanship of specified quality.

F. CONTRACTOR shall secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.03 TOLERANCES

A. CONTRACTOR shall monitor tolerance control of installed products to produce acceptable work and shall not permit tolerances to accumulate.

B. CONTRACTOR shall comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, CONTRACTOR shall request clarification from ENGINEER before proceeding.

C. CONTRACTOR shall adjust products to appropriate dimensions; position before securing products in place.

1.04 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. When specified in individual specification sections or when requested by ENGINEER, CONTRACTOR shall require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, and quality of workmanship.

B. CONTRACTOR shall submit qualifications of observer to ENGINEER 30 days in advance of required observations.

C. CONTRACTOR shall report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

D. CONTRACTOR shall submit report in duplicate within 30 days of observation to ENGINEER for information.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Temporary utilities.
   2. Temporary support facilities.
   3. Removal of temporary facilities.

B. CONTRACTOR shall arrange for and provide temporary facilities as required for proper and expeditious prosecution of the Work.

C. CONTRACTOR shall pay all costs, except as otherwise specified, until final acceptance of the Work unless OWNER makes arrangements for use of completed portions of the Work after substantial completion in accordance with the provisions of the General Conditions.

D. CONTRACTOR shall make all temporary connections to utilities and services in locations acceptable to OWNER and local authorities having appropriate jurisdiction.
   1. Furnish all necessary labor and materials.
   2. Make all installations in a manner subject to the acceptance of such authorities and OWNER.
   3. Maintain such connections.
   4. Remove temporary installation and connection when no longer required.
   5. Restore services and sources of supply to proper operating conditions.

1.02 TEMPORARY UTILITIES

A. Temporary Toilets: CONTRACTOR shall provide and maintain sanitary temporary chemical toilets located where approved by OWNER and in sufficient number required for the work force employed by CONTRACTOR.

B. Temporary Electrical Services:
   1. CONTRACTOR shall make all necessary arrangements, furnish, install, and maintain necessary temporary electrical services at the Site. CONTRACTOR shall coordinate source of temporary electrical facilities with OWNER. CONTRACTOR shall remove all temporary services when Project is complete.
   2. Construction areas, aisles, stairs, and ramps shall be illuminated to 5 fc. Construction shops, storerooms, mechanical, and electrical rooms shall be illuminated to 10 fc. Offices illuminated to 30 fc.
   3. Temporary lights shall be equipped with heavy-duty electric cords and lamp guards. They must not be suspended by the power supply cord unless it is designed for this use.
   4. All utility charges for installation of the temporary services shall be paid for by CONTRACTOR. All metering installation charges and all energy charges for

electric current used for temporary lighting and power are to be paid by CONTRACTOR.

5. No permanent electrical equipment or wiring shall be used without express written permission of OWNER. Such approval, if given, shall not affect guarantee period. If OWNER authorizes use of permanent service facilities, CONTRACTOR shall pay all metering costs until acceptance or occupancy (whichever occurs first) of building by OWNER.

C. Weather Protection and Temporary Heat:
   1. CONTRACTOR shall provide weather protection to protect the Work from damage because of freezing, rain, snow, and other inclement weather.
   2. No permanent heating equipment shall be used on a temporary basis without express written permission by OWNER. Such approval, if given, shall not affect the guarantee period.

D. Temporary Water: CONTRACTOR shall supply its own water during construction. CONTRACTOR shall also provide its own piping, valves, and appurtenances for its requirements. Connection to the existing water system shall be coordinated with OWNER and shall meet all code requirements including disinfection and backflow prevention.

E. Temporary Fire Protection: CONTRACTOR and Subcontractor(s) who maintain or provide an enclosed shed or trailer shall provide and maintain in operating order in each shed or trailer a minimum of one fire extinguisher. More extinguishers shall be provided as necessary. Fire extinguishers shall be minimum dry chemical, nonfreezing-type, UL rating 2A-30BC, with 10-pound capacity for Class A, B, and C fires.

1.03 TEMPORARY SUPPORT FACILITIES

A. CONTRACTOR shall provide whatever facilities and services which may be needed to properly support primary construction process and meet compliance requirements and governing regulations.

B. CONTRACTOR shall not use permanent facilities except as otherwise indicated, unless authorized by OWNER.

1.04 REMOVAL OF TEMPORARY FACILITIES

A. Remove temporary materials, equipment, services, and construction as soon as practicable but no later than just prior to final completion inspection.

B. Clean and repair damage caused by installation or use of temporary facilities and restore existing facilities used during construction to specified, or to original, condition.

C. Minor temporary facilities which interfere with OWNER's operations shall be removed at the end of each Work period.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 52 13

FIELD OFFICES AND SHEDS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Materials, equipment, and furnishings.
   2. Construction.
   3. Environmental control.
   4. CONTRACTOR office and facilities.
   5. Storage areas and sheds.
   6. Preparation.
   7. Maintenance and cleaning.
   8. Removal.

PART 2–PRODUCTS

2.01 MATERIALS, EQUIPMENT, AND FURNISHINGS

A. Materials, equipment, and furnishings shall be serviceable, new or used, and adequate for required purpose.

2.02 CONSTRUCTION

A. Portable or mobile buildings or buildings shall be constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.

B. CONTRACTOR shall provide structurally sound, secure, weathertight enclosures for office and storage spaces.

C. Temperature transmission resistance of floors, walls, and ceilings shall be compatible with occupancy and storage requirements.

D. Exterior materials shall be weather resistant.

E. Interior materials in offices shall consist of sheet type materials for walls and ceilings, prefinished or painted; resilient floors and bases.

F. Provide appropriate type fire extinguisher each storage area.

G. Interior materials in storage sheds shall be as required to provide specified conditions for storage of products.

2.03 ENVIRONMENTAL CONTROL

A. Heating and ventilation for storage spaces shall be as needed to maintain products in accordance with Contract Documents and to provide adequate lighting for maintenance and observation of products.

2.04 CONTRACTOR OFFICE AND FACILITIES

A. CONTRACTOR shall provide facilities to meet CONTRACTOR's needs.

2.05 STORAGE AREAS AND SHEDS

A. Provide storage areas and sheds of size to meet storage requirements for products of individual sections, allowing for access and orderly provision for maintenance and for observation of products to meet requirements of Section 01 60 00–Materials and Equipment.

PART 3–EXECUTION

3.01 PREPARATION

A. CONTRACTOR shall fill and grade sites for temporary structures to provide drainage away from buildings.

3.02 MAINTENANCE AND CLEANING

A. CONTRACTOR shall maintain approach walks free of mud, water, and snow.

3.03 REMOVAL

A. Upon final acceptance and completion of the Work, CONTRACTOR shall remove field offices, foundations, utility services, and debris and shall restore areas.

END OF SECTION

SECTION 01 57 00

TEMPORARY CONTROLS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Dust Control.
   2. Water, Erosion, and Sediment Control.
   3. Traffic Control.
   4. Site Security.
   5. Daily Cleanup.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

3.01 DUST CONTROL

A. CONTRACTOR shall execute the Work by methods to minimize raising dust from construction operations.

B. CONTRACTOR shall provide positive means to prevent airborne dust from dispersing into atmosphere.

3.02 WATER, EROSION, AND SEDIMENT CONTROL

A. CONTRACTOR shall grade site to drain and shall maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. CONTRACTOR shall protect Site from puddling or running water.

C. CONTRACTOR shall provide erosion control measures as necessary to control discharge of sediment laden water to surface waters and wetlands.

D. Except as provided for in the document, overland discharge of water from dewatering operations shall not be allowed. Depending on water quality, such water shall either be piped directly to the surface water or shall be directed to sedimentation basins or other such structures or features prior to discharge to surface waters so as not to cause damage to existing ground and improvements, erosion, or deposition in the discharge area.

E. CONTRACTOR shall use jute or synthetic netting, silt fences, straw bales, dikes, channels, and other applicable measures to prevent erosion of soils disturbed by its construction operation.

F. Restoration of the Site shall proceed concurrently with the construction operation. See Drawings and Specifications for erosion control measures in addition to that which may be required above.

G. Erosion control measures shall comply with the following document: Kentucky's Best Management Practices for Construction Activities.

3.03 TRAFFIC CONTROL

A. CONTRACTOR shall be responsible for providing all signs, barricades, flagmen, and other traffic control devices in areas of the treatment plant that are impacted by construction.

B. Do not close or obstruct roadways without approval of OWNER.

C. Conduct operations with minimum interference to roadways.

3.04 SITE SECURITY

A. CONTRACTOR shall have the sole responsibility of safeguarding the Site perimeter to prevent unauthorized entry to the Site throughout the duration of the Project. CONTRACTOR shall at all times provide such permanent and temporary fencing or barricades or other measures as may be necessary to restrict unauthorized entry to its construction area including construction in public rights-of-way or easements. Site security measures shall include safeguards against attractive nuisance hazards as a result of construction activity.

B. CONTRACTOR shall at all times be responsible for the security of the Work including materials and equipment. OWNER will not take any responsibility for missing or damaged equipment, tools, or personal belongings. CONTRACTOR shall have the sole responsibility of safeguarding the Work and the Site throughout the duration of the Project.

3.05 DAILY CLEANUP

A. CONTRACTOR shall clean up the Site and remove all rubbish on a daily basis.

B. CONTRACTOR shall clean up streets and roads and remove any dirt, mud, or other materials due to project traffic on daily basis and shall comply with all local and state ordinances and permit requirements.

END OF SECTION

SECTION 01 60 00

MATERIALS AND EQUIPMENT

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: CONTRACTOR shall be responsible for the delivery, handling, storage and protection of all material and equipment required to complete the Work as specified herein.

B. Related Sections and Divisions: Specific requirements for the handling and storage of material and equipment are described in other sections of these Specifications.

1.02 PRODUCTS

A. Components required to be supplied in quantity within a Specification section shall be the same, and shall be interchangeable.

B. CONTRACTOR shall not use materials and equipment removed from existing construction, except as specifically required, or allowed, by the Contract Documents.

C. When any construction deviations from the Drawings and/or Specifications necessary to accommodate equipment supplied by CONTRACTOR, result in additional costs to CONTRACTOR or other contractors, such additional costs shall be borne by CONTRACTOR. CONTRACTOR shall also pay any additional costs necessary for revisions of Drawings and/or Specifications by ENGINEER.

D. Each major component of equipment shall bear a nameplate giving the name and address of the manufacturer and the catalogue number or designation.

1.03 TRANSPORTATION AND HANDLING

A. Materials, products and equipment shall be properly containerized, packaged, boxed, and protected to prevent damage during transportation and handling.

B. CONTRACTOR shall not overload any portion of the structure in the transporting or storage of materials.

C. CONTRACTOR shall not damage other construction by careless transportation, handling, spillage, staining or impact of materials.

D. CONTRACTOR shall provide equipment and personnel to handle products, including those provided by OWNER, by methods to prevent soiling and damage.

E. CONTRACTOR shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.

F. CONTRACTOR shall handle product by methods to avoid bending or overstressing. Lift large and heavy components only at designated lift points.

1.04 DELIVERY AND RECEIVING

A. CONTRACTOR shall arrange deliveries of products in accordance with the Progress Schedule, allowing time for observation prior to installation.

B. CONTRACTOR shall coordinate deliveries to avoid conflict with the Work and conditions at the Site; work activities of other contractors or OWNER; limitations on storage space; availability of personnel and handling equipment and OWNER's use of premises.

C. CONTRACTOR shall deliver products in undamaged, dry condition, in original unopened containers or packaging with identifying labels intact and legible.

D. CONTRACTOR shall clearly mark partial deliveries of component parts of equipment to identify equipment and contents to permit easy accumulation of parts and to facilitate assembly.

E. Immediately on delivery, CONTRACTOR shall inspect shipment to assure:
   1. Product complies with requirements of Contract Documents and reviewed submittals.
   2. Quantities are correct.
   3. Accessories and installation hardware are correct.
   4. Containers and packages are intact and labels legible.
   5. Products are protected and undamaged.

1.05 STORAGE AND PROTECTION

A. General:
   1. CONTRACTOR shall store products, immediately on delivery, in accordance with manufacturer's instructions, with all seals and labels intact and legible.
   2. CONTRACTOR shall coordinate storage locations with OWNER.

B. In enclosed storage, CONTRACTOR shall:
   1. Provide suitable temporary weather tight storage facilities as may be required for materials that will be damaged by storage in the open.
   2. Maintain temperature and humidity within ranges stated in manufacturer's instructions.
   3. Provide ventilation for sensitive products as required by manufacturer's instructions.
   4. Store unpacked and loose products on shelves, in bins, or in neat groups of like items.
   5. Store solid materials such as insulation, tile, mechanical and electrical equipment, fittings, and fixtures under shelter, in original packages, away from dampness and other hazards.
   6. Store liquid materials away from fire or intense heat and protect from freezing.

C. At exterior storage, CONTRACTOR shall:
   1. Store unit materials such as concrete block, brick, steel, pipe, conduit, door frames, and lumber off ground, out of reach of dirt, water, mud and splashing.
   2. Store tools or equipment that carry dirt outside.
   3. Store large equipment so as not to damage the Work or present a fire hazard.
   4. Cover products subject to discoloration or deterioration from exposure to the elements, with impervious sheet material and provide ventilation to avoid condensation.
   5. Completely cover and protect any equipment or material which is prime coated or finish painted with secured plastic or cloth tarps. Store out of reach of dirt, water, mud and splashing.

6. Store loose granular materials on clean, solid surfaces such as pavement, or on rigid sheet materials, to prevent mixing with foreign matter.
7. Provide surface drainage to prevent erosion and ponding of water.
8. Prevent mixing of refuse or chemically injurious materials or liquids.
9. Cover aggregates such as sand and gravel in cold wet weather.
10. Remove all traces of piled bulk materials at completion of work and return site to original or indicated condition.

1.06 MAINTENANCE OF STORAGE

A. CONTRACTOR shall periodically inspect stored products on a scheduled basis.

B. CONTRACTOR shall verify that storage facilities comply with manufacturer's product storage requirements, and verify that manufacturer required environmental conditions are maintained continually.

C. CONTRACTOR shall verify that surfaces of products exposed to the elements are not adversely affected and that any weathering of finishes is acceptable under requirements of Contract Documents.

D. CONTRACTOR shall perform scheduled maintenance of equipment in storage as recommended by the manufacturer. A record of the maintenance shall be kept and turned over to ENGINEER when the equipment is installed.

1.07 INSTALLATION REQUIREMENTS

A. Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the respective manufacturers, unless otherwise specified.

B. After installation, CONTRACTOR shall protect all materials and equipment against weather, dust, moisture, and mechanical damage.

C. CONTRACTOR shall be responsible for all damages that occur in connection with the care and protection of all materials and equipment until completion and final acceptance of the Work by OWNER. Damaged material and equipment shall be immediately removed from the Site.

1.08 EQUIPMENT WARRANTIES

A. Warranties shall be nonprorated, include all parts and labor, and be in written form. Warranties shall specifically exclude buyer's indemnification language. Warranty language shall not eliminate manufacturer's responsibility for sizing of the equipment. During warranty period, manufacturer shall be responsible for any travel expenses, outside contractor fees, and rental equipment fees associated with providing warranty service. Manufacturer shall pay expenses incurred for repairs and parts replacement not made by manufacturer if manufacturer's response is not within 72 hours of notification by OWNER. Warranty language shall be provided with the shop drawings.

1.09 CONCRETE EQUIPMENT BASE

A. Cast-in-place concrete equipment bases shall be provided for all new and relocated equipment including electrical control panels, motor control centers, switchgear, etc.

Concrete equipment bases shall be provided by CONTRACTOR except where specifically noted to be provided by others. Bases shall be 3 1/2-inch minimum height and shall be a minimum of 3 inches larger than equipment being supported. Grouting of equipment bases shall be as recommended by equipment manufacturer.

B. Concrete and grout shall meet applicable sections of the specifications.

C. Provide all anchor bolts, metal shapes and templates to be cast in concrete or used to form concrete for support of equipment.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 73 29

CUTTING, PATCHING, AND ALTERATIONS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: CONTRACTOR shall be responsible for all cutting, fitting, patching, and other alterations required to complete the Work as specified herein or to:
   1. Make its several parts fit together properly.
   2. Uncover portions of the Work to install improperly sequenced Work.
   3. Remove and replace defective Work.
   4. Remove and replace Work not conforming to requirements of the Contract Documents.
   5. Remove samples of installed Work as specified for testing.
   6. Provide penetrations of surfaces for installation of piping and electrical conduit.
   7. Rehabilitate or renovate existing facilities.

1.02 REFERENCES

A. ANSI A10 Safety Requirements for Construction and Demolition.

1.03 QUALITY ASSURANCE

A. CONTRACTOR shall perform all cutting, patching, and alterations in strict accordance with pertinent requirements of these Specifications.

B. Except as modified by governing codes, CONTRACTOR shall comply with the applicable provision and recommendations of ANSI A10.

1.04 SUBMITTALS

A. CONTRACTOR shall submit a written request to OWNER well in advance of executing any cutting or alteration which affects the following:
   1. Work of OWNER or any separate contractor.
   2. Structural value or integrity of any element of the Project.
   3. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
   4. Efficiency, operational life, maintenance, or safety of operational elements.
   5. Visual qualities of sight-exposed elements.

B. The request shall include:
   1. Description of affected work.
   2. The necessity for cutting, patching, or alteration.
   3. Effect on work of OWNER, any separate contractor, or on the structural or weather-proof integrity of the Project.
   4. Description of proposed work to include:
      a. Scope of cutting, patching, or alteration.
      b. Trades who will execute the work.
      c. Products proposed to be used.
      d. Extent of refinishing to be done.

5. Alternatives to cutting and patching.
6. Written permission of any separate contractor whose work will be affected.

C. Submit written notice to OWNER designating the date and the time the Work will be uncovered or executed.

1.05 SCHEDULING AND COORDINATION

A. All work under this section shall be coordinated with OWNER's work forces and those of other contractors and shall be accomplished at times acceptable to OWNER.

B. Before starting any work relating to existing utilities (electrical, sewer, water, heat, gas, fire lines, etc.) that will temporarily discontinue or disrupt service to existing facilities, notify ENGINEER and OWNER 72 hours in advance and obtain OWNER's approval before proceeding with this phase of the work. Temporary facilities, if required, shall be in place prior to disruption of service.

PART 2–PRODUCTS

2.01 NEW MATERIALS

A. For replacement of work removed, CONTRACTOR shall use materials which comply with the pertinent sections of these Specifications.

2.02 SALVAGEABLE MATERIAL

A. Materials or items designated to be reinstalled or to become the property of OWNER shall be as specified or as shown on the Drawings.

B. CONTRACTOR shall remove such items with care under the supervision of the trade responsible for reinstallation.

C. CONTRACTOR shall store these materials (off-site if necessary) and protect from damage until they are incorporated into the new work.

D. Items which are not to be reinstalled but are to become the property of OWNER shall be removed by CONTRACTOR with care, cleaned, and stored in a location at the Site to be approved by OWNER.

E. Materials or items damaged in its removal shall be replaced by CONTRACTOR with similar new material at no additional cost to OWNER.

2.03 UNSALVAGEABLE MATERIALS

A. Materials or items demolished and not designated to become the property of OWNER or not designated to be reinstalled shall become the property of CONTRACTOR and shall be removed from the site and legally and properly disposed of by CONTRACTOR.

B. Materials shall be removed by CONTRACTOR in a manner that will avoid damage to materials or equipment to remain.

PART 3–EXECUTION

3.01 INSPECTION

A. CONTRACTOR shall inspect existing conditions including elements subject to movement or damage during cutting, patching, and other alterations.

B. After uncovering the work, CONTRACTOR shall inspect conditions affecting installation of new products or performance of new work.

C. CONTRACTOR shall report unsatisfactory or questionable conditions to ENGINEER in writing.

D. CONTRACTOR shall not proceed with work until unsatisfactory or questionable conditions are resolved.

E. Beginning of cutting, patching, and alterations work means acceptance of existing conditions by CONTRACTOR.

3.02 PREPARATION AND PROTECTION

A. CONTRACTOR shall provide temporary bracing, shoring, needling, and support of the structure during alterations work as necessary to prevent collapse, settling, or deflection and to protect persons and property from injury or damage.

B. Temporary supports must adequately carry all existing and imposed load.

C. CONTRACTOR shall provide and maintain temporary protection of surface finishes, equipment, and adjacent work designated to remain where demolition, removal, and new work is being done, connections are being made, materials are being handled, or equipment is being removed.

D. CONTRACTOR shall provide adequate fire protection in accordance with local Fire Department requirements.

E. CONTRACTOR shall provide waterproofing, weather protection, heat, and other facilities for that portion of the work which may be exposed by cutting and patching, demolition, or other alterations.

F. CONTRACTOR shall cut, move, or remove items as necessary for access to alterations and renovations work and replace and restore at completion of work.

G. CONTRACTOR shall prepare surfaces and remove surface finishes to provide for proper installation of new work and new finishes.

H. CONTRACTOR shall be responsible for any damage to the existing structure or its contents directly or indirectly by its crews or those of its subcontractors.

3.03 PERFORMANCE

A. CONTRACTOR shall accomplish all work of cutting, removal, demolition, patching, or other alterations using only persons skilled in the appropriate trade.

B. CONTRACTOR shall execute the work in a careful and orderly manner.

C. CONTRACTOR shall execute cutting and demolition by methods which will prevent damage to other work and will provide proper surfaces to receive installation of repairs.

D. CONTRACTOR shall execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.

E. CONTRACTOR shall fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

F. CONTRACTOR shall thoroughly clean and prepare all surfaces to receive new finish or covering to completely remove all dirt, dust, grease, oil, paint, loose materials, and soil.

G. CONTRACTOR shall refinish entire surface as necessary to provide an even finish to match adjacent finishes:
   1. For continuous surfaces, refinish to nearest intersection.
   2. For an assembly, refinish entire unit.

3.04 DEMOLITION, CUTTING, AND REMOVAL

A. Cutting and removal of construction shall be performed by CONTRACTOR so as not to cut or remove more than is necessary and so as not to damage adjacent work.

B. CONTRACTOR shall cut out embedded anchorages and attachment items as required to properly provide for patching and repair of the respective finishes.

C. CONTRACTOR shall not cut structural work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio.

D. CONTRACTOR shall not cut operational elements and safety components in a manner resulting in decreased performance, shortened useful life, or increased maintenance.

E. CONTRACTOR shall not cut work exposed to view (exterior or interior) in a manner resulting in noticeable reduction of visual qualities as determined by OWNER.

F. Construction that is to remain which is loosened, cracked, or otherwise damaged or defaced as a result of careless cutting or demolition and is unsuitable for use intended shall be removed and replaced at no additional cost to OWNER.

G. CONTRACTOR shall clean demolished areas and remove debris, waste, and rubbish from the building at the conclusion of each day's work.

H. CONTRACTOR shall not let piled waste material endanger the structure.

3.05 PATCHING, EXTENDING, AND MATCHING

A. Patching work shall conform to the standards of the Specifications where applicable, and where not specified, work shall conform to the highest standards of the applicable trade.

B. CONTRACTOR shall patch construction to match adjacent work unless noted otherwise.

C. Patching or restoration shall be carried to natural breaks (e.g., corners) wherever possible.

D. CONTRACTOR shall provide adequate support to substrate for patching finishes.

E. Transitions: CONTRACTOR shall restore existing work that is damaged during patching operations to a condition equal to its construction at the time of the start of work.

3.06 UNANTICIPATED MECHANICAL AND ELECTRICAL WORK EXPOSED

A. Where unanticipated mechanical piping or electrical conduit is exposed during demolition removal or rerouting shall be accomplished by CONTRACTOR as applicable.
   1. Rerouted piping shall be located and shall be connected to maintain all functions in proper operations.
   2. Abandoned piping may be left in place where it is buried in floors or walls, providing that it is completely disconnected from its source.
   3. There shall be no "dead end" gas, water, sewer, or vent piping existing in the completed work.
   4. Unless otherwise shown, abandoned piping, ductwork, conduit, or other mechanical or electrical items shall be completely removed.

B. Removals, capping, or otherwise terminating services which are abandoned shall be accomplished without additional cost to OWNER.

C. Relocation of services resulting from unanticipated conflicts of new and existing work in concealed spaces shall be paid for in accordance with the General Conditions.

END OF SECTION

SECTION 01 77 00

CONTRACT CLOSEOUT

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Closeout procedures.
   2. Final cleaning.
   3. Adjusting.
   4. Project record documents.
   5. Warranties.
   6. Spare parts and maintenance materials.

1.02 CLOSEOUT PROCEDURES

A. CONTRACTOR shall provide submittals to ENGINEER that are required by governing or other authorities.

B. CONTRACTOR shall comply with General Conditions and Supplementary Conditions and complete the following before requesting ENGINEER's observation of the Work or designated portion thereof for substantial completion.
   1. Submit executed warranties, workmanship bonds, maintenance agreements, inspection certificates, and similar required documentation for specific units of Work, enabling OWNER's unrestricted occupancy and use.
   2. Submit record documentation, maintenance manuals, tools, spare parts, keys, and similar operational items.
   3. Submit consent of surety (if surety required in Contract).
   4. Complete final cleaning, touch-up work of marred surfaces, and remove temporary facilities and tools.

1.03 FINAL CLEANING

A. It is CONTRACTOR's responsibility to completely clean up the construction site at the completion of the Work.

B. CONTRACTOR shall clean areas in which painting and finishing work is to be performed just prior to the start of this work and maintain these areas in satisfactory condition for painting and finishing. This cleaning includes:
   1. Removal of trash and rubbish from these areas.
   2. Broom cleaning of floors.
   3. Removal of any mortar, dust, and other extraneous materials from finish surfaces, including but not limited to exposed structural steel, miscellaneous metal, masonry, concrete, mechanical equipment, piping, and electrical equipment.

C. In addition to the cleaning specified above and the more specific cleaning that may be required in various technical sections of the Specifications, CONTRACTOR shall complete the following cleaning:
   1. Replace filters of operating equipment.

2. Clean site; sweep paved areas, rake clean landscaped surfaces.
3. Remove waste and surplus materials, rubbish, and construction facilities from the Site.

1.04 ADJUSTING

A. CONTRACTOR shall adjust operating products and equipment to ensure smooth and unhindered operation.

1.05 PROJECT RECORD DOCUMENTS

A. CONTRACTOR shall maintain on Site one set of the following record documents to record actual revisions to the Work:
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. CONTRACTOR shall ensure entries are complete and accurate, enabling future reference by OWNER.

C. CONTRACTOR shall store record documents separate from documents used for construction.

D. CONTRACTOR shall record information concurrent with construction progress.

E. Specifications: CONTRACTOR shall 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: CONTRACTOR shall 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.

1.06 WARRANTIES

A. CONTRACTOR shall provide warranties beyond project one-year warranty as required by technical sections and as follows.

B. Submit warranty information as follows:
1. Provide notarized copies.

2. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers, and provide Table of Contents and assemble in three-ring binder with durable cover.
3. Submit with request for certificate of Substantial Completion.
4. For items of work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance listing date of acceptance as start of warranty period.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

A. CONTRACTOR shall provide spare parts, maintenance, and extra materials in quantities specified in individual specification sections.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 91 00

STARTING OF SYSTEMS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. General.
   2. Equipment and system installation.
   3. Starting equipment and systems.
   4. Demonstration, instructions, and operator training.
   5. Start-up and testing.
   6. Equipment systems requiring certification of proper installation.

B. CONTRACTOR shall perform the Work described in the following subsections.

1.02 GENERAL

A. The number of days for manufacturer's services stated in the Specifications shall be considered as the minimum number of days. Should additional time be required for services because of equipment malfunction or other problem, such time shall be at the expense of CONTRACTOR, with no change in Contract Price.

B. "Days" specified shall consist of 8-hour days on-site, excluding travel time.

C. CONTRACTOR shall designate and provide one person to be responsible for scheduling, coordinating, and expediting the specified services. Scheduling the services shall be done in cooperation with, and with the prior approval of ENGINEER and OWNER. Such schedule shall be arranged with the appropriate subcontractors, manufacturers, and suppliers with sufficient time to allow their compliance with the service requirements.

D. CONTRACTOR shall manage equipment checkout such that checkout has been completed and deficiencies addressed prior to demonstration and training. Scheduling training prior to checkout may result in cancellation when checkout cannot be completed prior to training.

1.03 EQUIPMENT AND SYSTEM INSTALLATION

A. Competent and experienced technical personnel shall represent the manufacturers of all equipment and systems for as many days as may be necessary to provide proper installation and to resolve assembly or installation problems at the site that are attributable to, or associated with, the equipment furnished. This requirement applies to manufacturers for all equipment furnished, whether or not specifically set forth in the Specifications.

B. Where a manufacturer's certificate is called for in this Specification Section, the manufacturer's representative shall provide the attached certificate stating that the equipment or system has been installed in accordance with the manufacturer's instructions and has been inspected by a manufacturer's authorized representative, that it has been serviced with the proper initial lubricants, that applicable safety equipment has been properly installed, that the proper electrical and mechanical connections have been made, and that

any other manufacturer requirements have been met. This certification shall be provided to ENGINEER and OWNER prior to the start-up. This certificate is in addition to the manufacturer's standard startup reports, checklists, and other pertinent information.

C. Functional (or run) testing is required for all equipment and systems. The manufacturer's representative shall supervise the functional test, which shall include checking for proper rotation, alignment, speed, excessive vibration, and noisy operation. The Manufacturer's Certificate of Proper Installation shall state that proper adjustments have been made and that the equipment or system is ready for start-up.

D. Manufacturer shall demonstrate, using laser alignment equipment, if appropriate, that the installed equipment has been aligned properly. Final acceptance of equipment will not be granted until manufacturer has demonstrated to ENGINEER that acceptable alignment to tolerances have been achieved. For pumps with motors 7.5 hp and larger, the acceptable shaft alignment tolerances shall be as recommended in the pump manufacturer's written instructions and shall include parallel offset and angular gap measurements.

1.04 STARTING EQUIPMENT AND SYSTEMS

A. Where field testing and start-up services are called for in the Specifications, or when technical assistance is necessary as a result of any malfunction of the equipment or system furnished, the manufacturer's representative shall provide such services.

B. Manufacturer's representative shall also conduct and/or assist with performance testing, as required by the Specifications. These services shall continue until such times as the applicable equipment or system has been successfully tested for performance and has been accepted by OWNER for full-time operation.

C. Coordinate schedule for start-up of various equipment and systems. Coordination includes, but is not limited to, communication with subcontractors, suppliers, OWNER, and ENGINEER. CONTRACTOR shall confirm that all necessary work is complete and that the equipment and systems can be operated in conjunction with all associated processes.

D. Notify ENGINEER and OWNER a minimum of 7 days prior to start-up of each item.

E. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or for other conditions that may cause damage.

F. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

G. Verify wiring and support components for equipment are complete and tested.

H. Execute start-up under supervision of applicable manufacturer's representative and CONTRACTOR's personnel in accordance with manufacturers' instructions.

I. 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.

J. Equipment manufacturer shall provide a written report covering checkout, testing, inspections, and start-up and shall identify any deficiencies noted. Report shall be submitted

to ENGINEER. CONTRACTOR shall be responsible for correcting all deficiencies noted in report. In addition, CONTRACTOR shall submit a fully executed Certificate of Proper Installation form if required in Paragraph 3.01 of this section.

1.05 DEMONSTRATION, INSTRUCTIONS, AND OPERATOR TRAINING

A. For all mechanical equipment and systems and where called for in the Specifications, provide a qualified technical representative to provide detailed instructions to OWNER's personnel for operation and maintenance of equipment and associated instrumentation. Training services shall include pre-start-up classroom instruction and start-up on-site instruction, as stated in the Specifications.

B. Refer to the Specifications for additional training requirements.

C. CONTRACTOR shall coordinate the pre-start-up training periods with OWNER's operating personnel and manufacturers' representatives.
   1. Schedule training dates and times with OWNER, that are acceptable to the OWNER, using equipment, startup, and O&M training form. Normal hours available for training are between 8:30 A.M. to 3 P.M., Monday through Friday, except for holidays.
   2. Submit outline and presentation to ENGINEER at least 7 days in advance of training.
   3. Provide name, contact information, and brief synopsis of qualifications of the trainer.
   4. If materials above are not provided at least 7 days in advance, training may be canceled.
   5. Failure of supplier's or manufacturer's representative to appear for scheduled training, failure to notify OWNER 24 hours in advance of need to cancel scheduled training or failure to arrive within 30 minutes of start of scheduled training shall result in reimbursement to OWNER for time lost by OWNER's personnel in waiting for arrival of manufacturer's representative. Except in case of failure to arrive on time, time will not exceed 1 hour for each employee scheduled to receive training. Failure to arrive on time will be reimbursed by actual time late, up to 1 hour, after 1 hour, training will be rescheduled. CONTRACTOR shall reimburse OWNER via a change order.
   6. During the training, instructor will dedicate its time solely to training and not start-up services.
   7. Utilize 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.
   8. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment.
   9. Prepare and insert additional data in operation and maintenance manuals when need for additional data becomes apparent during instruction.
   10. OWNER may videotape the training for future internal use. Provide to OWNER paper and electronic copies of any media used as part of training.
   11. Provide training handouts for each of OWNER's personnel present.

D. CONTRACTOR shall provide attached Certificate of Operator Training cosigned by OWNER and supplier's representative verifying training was accomplished to satisfaction of all parties.

E. Operation and maintenance manual submitted in accordance with Section 01 30 00–Submittals shall be provided prior to operator training.

F. For equipment or systems requiring seasonal operation, perform demonstration for dormant season at start of dormant season.

G. Final payment for various items of equipment will not be made by OWNER until the equipment is operating to OWNER's satisfaction.

H. Where items of equipment are placed into service at different times or sequence, manufacturer's services for start-up, field testing, and supervision shall be provided for each time or sequence. Training shall be provided prior to or at the time the first similar item of equipment is placed in service.

1.06 START-UP AND TESTING

A. Prior to acceptance of any portion of the Work, start-up and testing of all equipment and testing of all materials furnished on the Project by CONTRACTOR shall have been conducted in the presence of representatives of CONTRACTOR, OWNER, and ENGINEER and also manufacturer if requested by OWNER or ENGINEER.

B. CONTRACTOR shall provide whatever temporary installations and conditions are necessary in order to perform start-up and testing operations on all equipment and materials furnished under the Contract. Temporary connections and equipment necessary during start-up and testing operations shall include, but not be limited to, temporary piping and electrical power and control equipment and devices, temporary connection from various parts of the systems and any other labor, materials, fuel, devices, or items that may be required for start-up and testing operations. Temporary conditions shall include filling with water, if necessary, to check equipment and materials.

C. All temporary installations and conditions shall be removed by CONTRACTOR upon completion of start-up and testing.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

3.01 EQUIPMENT SYSTEMS REQUIRING CERTIFICATION OF PROPER INSTALLATION

A. 35 22 25–Slide Gates.

B. All equipment specified in Division 11.

C. All Special Structures specified in Division 13.

D. All Conveying Systems specified in Division 14.

E. All space and process related heating, cooling, and ventilation equipment and systems specified in Division 15.

F. 26 09 00–Controls and Instrumentation (PART 3–EXECUTION).

END OF SECTION

CERTIFICATE OF PROPER INSTALLATION

Project_____

Equipment_____

Specification Section_____

Contract_____

I hereby certify the equipment supplier/manufacturer has inspected this equipment and that it has been properly installed, adjusted, and calibrated. I further certify this equipment may now be operated for test purposes and/or normal use.

MANUFACTURER'S REPRESENTATIVE

Signature_____Date_____

Name (print)_____

Title_____

Representing_____

CONTRACTOR

Signature_____Date_____

Name (print)_____

Title_____

This form shall be completed and submitted to ENGINEER prior to OWNER training.

CERTIFICATE OF OPERATOR TRAINING

Project_____

Equipment_____

Specification Section_____

Contract_____

I hereby certify the equipment supplier/manufacturer has instructed OWNER's personnel in the start-up operation and maintenance of this equipment as required in the Specifications.

MANUFACTURER'S REPRESENTATIVE

Signature_____Date_____

Name (print)_____

Title_____

Representing_____

CONTRACTOR

Signature_____Date_____

Name (print)_____

Title_____

OWNER

I hereby certify that my operating personnel received instruction for start-up, operation, and maintenance of this equipment.

Signature_____Date_____

Name (print)_____

Title_____

END SECTION

SECTION 02 41 00

DEMOLITION

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: All demolition, removal, and salvage work as shown on the drawings or specified herein to include, but not necessarily limited to the following:
   1. Zone 1 Aeration Tank Spray Bars (Bid Alternative No. 2).
   2. Zone 2 Aeration Tank Spray Bars (Bid Alternative No. 3).
   3. Odor Control Building Shell (retain equipment).

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

A. CONTRACTOR shall submit permits and notices, if required, authorizing building demolition.

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 01 of these specifications and in accordance with the construction phases of this project and work to be done by other contractors.

PART 2–PRODUCTS

2.01 GENERAL

A. Compacted fill, including degree of compaction, shall meet the requirements of Section 31 23 00–Excavation, Fill, Backfill and Grading.

B. Pipe fittings and materials shall meet the requirements of Section 40 23 00–Buried Piping and Appurtenances and Section 40 05 02–Piping and Appurtenances.

PART 3–EXECUTION

3.01 BREAKING DOWN AND REMOVING STRUCTURES

A. General:
   1. All existing structures, with all attached parts and connections, shown on the drawings or specified to be removed, or that interfere with the new construction, shall be entirely removed within the limits shown or specified, unless otherwise provided.
   2. When a portion of an existing structure is to be retained, CONTRACTOR shall take care during construction operations so as not to impair the value of the retained portion.
      a. Complete all operations necessary for the removal of any existing structure which might endanger the new construction prior to the construction of the new work.
      b. Do not use any equipment or devices which might damage structures, facilities, or property which are to be preserved and retained.
   3. When existing reinforcing is exposed at the surface of removal areas, CONTRACTOR shall burn back the reinforcing bars 2 inches and patch with nonshrink grout unless noted otherwise.

B. Pavement, Curb, Gutter, Sidewalk, Driveways, Crosswalk, and Similar Structures:
   1. Where portions of the existing structure are to be left in the surface of the finished work, CONTRACTOR shall remove the structure to an existing joint, or saw and chip the structure to a true line.
   2. Sufficient removal shall be made to provide for proper grades and connections in the new work.

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 shall be removed to 1 inch below floor elevation and repaired with nonshrink grout plus surfacing to match existing.

E. 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 whether listed here or not: Zone 1 and Zone 2 Aeration Tank Spray Bars.

END OF SECTION

SECTION 03 11 00

CONCRETE FORMWORK

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Forms for cast-in-place concrete.
   2. Form accessories.
   3. Openings for other work.
   4. Form stripping.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. ACI 117–Tolerances for Concrete Construction.

B. ACI 301–Structural Concrete for Buildings.

C. ACI 318–Building Code Requirements for Reinforced Concrete.

D. ACI 347–Recommended Practice for Concrete Formwork.

E. PS1–Construction and Industrial Plywood.

1.03 DESIGN

A. All formwork shall comply with ACI 347 and ACI 301.

B. CONTRACTOR shall assume the responsibility for the complete design and construction of the formwork.

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Section 01 33 00–Submittals for form ties, form coatings, form liners (if any), and any other form accessories.

PART 2–PRODUCTS

2.01 FORMS

A. Forms shall be of wood, plywood, steel, fiberboard lined, or other approved materials which will produce concrete which meets the specified requirements. The type, size, quality, and shape of all materials of which the forms are made are subject to the review of ENGINEER.

B. Caution shall be exercised in the use of wood or composition forms or form liner to be certain that no chemical reaction will take place which causes a damaging effect on the concrete surface.

2.02 FORM TIES–NONREMOVABLE

A. Internal wall ties shall contain positive stops at the required wall thickness. The exterior clamp portions of the tie shall be adjustable in length. Ties shall have cones on the water side of water-containing structures. Ties shall also have cones on the exterior side of all structures which have PVC water-stopped construction joints. Ties shall provide a positive disconnection on both ends 1 to 1 1/2 inches inside the finished face of the concrete.

B. All wall ties used in the placement of structures which have PVC or hydrophilic water-stopped construction joints shall contain integral waterstops. All such ties shall be crimped or deformed in such a manner that the bond between concrete and tie cannot be broken in removal of the outer units. This portion of the tie shall not be removed prior to 24 hours after completion of the concrete placement.

C. The use of wood spacers and wire ties will not be approved.

2.03 FORM TIES–REMOVABLE

A. Taper ties which are designed to be removed entirely from the wall may be used with forms designed for this tie type and spacing.

B. Tie holes shall be plugged with either a neoprene plug, Sure-Plug by Dayton Superior, Inc., or an EPDM rubber plug, X-Plug by Sika Greenstreak, or equal.

C. Cementitious waterproofing material for patching taper tie holes shall be Hey Di K-11, Xypex Patch-N-Plug, or equal. Taper tie holes above the normal operating water surface shall be patched with mortar mix as specified in Section 03 30 00–Cast-in-Place Concrete for patching tie holes.

2.04 FORM COATINGS

A. Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.

2.05 CHAMFER STRIPS

A. Provide 3/4-inch by 3/4-inch wood or plastic chamfer strips at all exposed corners, except as noted.

2.06 KEYWAYS

A. Keyways shall be formed with wood inserts.

PART 3–EXECUTION

3.01 CONSTRUCTION

A. Forms shall conform to the shape, line, grade, and dimensions as shown on the drawings. They shall be mortar-tight and sufficiently rigid to prevent displacement or sagging between supports and shall support the loads and pressures without deflection from the prescribed lines. They shall be properly braced or tied together so as to maintain position and shape. Spacing of ties shall be recommended by the tie manufacturer.

B. Formwork and finished concrete construction shall meet the tolerances specified in ACI 117.

C. All exposed curved surfaces shall be formed to the continuous surface of the radius specified. Where segmented forms are proposed, a form system which deviates more than 3/8 inches from a circle through pan edges will not be allowed.

D. Architectural surfaces and surfaces to be fitted with equipment shall be formed to match the shape intended. Where indicated on the drawings, the form shall be lined with minimum 3/8-inch masonite and shimmed as required.

E. When forms are placed for successive concrete placement, thoroughly clean concrete surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets.

F. At the request of ENGINEER, temporary openings shall be provided at the base of column forms and wall forms and at other points where necessary to facilitate cleaning and observation immediately before depositing concrete.

G. Provide inserts and provide openings in concrete form work to accommodate work of other trades. Verify size and location of openings, recesses, and chases with the trade requiring such items. Securely support items to be built into forms.

H. Provide top forms for inclined surfaces where the slope is too steep to place and vibrate concrete.

I. Bevel wood inserts for forming keyways (except in expansion joints where inserts shall have square edges), reglets, recesses, and the like to assure ease of removal. Inserts shall be securely held in place prior to concrete placement. Unless otherwise shown, chamfer strips shall be placed in the angles of the forms to provide 3/4-inch bevels at exterior edges and corners of all exposed concrete.

J. The forms shall be oiled with a field-applied commercial form oil or a factory-applied nonabsorptive liner. Oil shall not stain or impede the wetting of surfaces to be cured with water or curing compounds. The forms shall be coated prior to placing reinforcing steel. Oil on reinforcement will not be permitted.

K. All form surfaces shall be thoroughly cleaned, patched, and repaired before reusing and are subject to review of ENGINEER.

3.02 FORM REMOVAL

A. Supporting forms and shoring shall not be removed until the member has acquired sufficient strength to support its own weight and the construction live loads on it.

B. All form removal shall be accomplished in such a manner that will prevent injury to the concrete.

C. Forms shall not be removed before the expiration of the minimum times as stated below or until the concrete has attained its minimum 28-day design strength as confirmed by concrete cylinder tests, unless specifically authorized by ENGINEER.
   1. Wall and vertical faces: 24 hours.
   2. Columns: 24 hours.
   3. Beams and elevated slabs: 14 days.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1–GENERAL

1.01 SUMMARY

A. Work includes providing complete, in-place, all steel and fibers required for reinforcement of cast-in-place concrete as shown on the drawings.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. Applicable standards listed in this section include, but are not necessarily limited to the following:
   1. ACI 315–Manual of Standard Practice for Detailing Reinforced Concrete Structures.
   2. ACI 318–Building Code Requirements for Reinforced Concrete.
   3. ASTM A1064–Standard Specifications for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
   4. ASTM A615–Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
   5. ASTM A996–Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcing.
   6. ASTM C1116-Standard Specification for Fiber-Reinforced Concrete.
   7. CRSI–Manual of Standard Practice.

1.03 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 00–Submittals.

B. Provide complete shop drawings of all material to be furnished and installed under this section:
   1. Before fabrication of the reinforcement is begun, CONTRACTOR shall obtain the approval of ENGINEER on reinforcing bar lists and placing drawings.
   2. These drawings and lists shall show in detail the number, size, length, bending, and arrangement of the reinforcing. Reinforcing supports shall also be located on the shop drawings.
   3. Shop drawings shall be in accordance with ACI 315.

1.04 PRODUCT HANDLING

A. Delivery:
   1. Deliver reinforcement to the job site bundled, tagged, and marked.
   2. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.

B. Storage: Store reinforcement at the job site on blocks and in a manner to prevent damage and accumulation of dirt and excessive rust.

PART 2–PRODUCTS

2.01 MATERIALS

A. Reinforcing bars shall comply with ASTM A615 or A996 Type R, Grade 60. Reinforcing bars required to be welded shall be ASTM A706 low alloy.

B. Steel wire and welded wire fabric shall comply with ASTM A1064. Fabric shall be provided in flat sheets. Rolled fabric shall not be used.

C. Reinforcement supports including bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place shall be:
   1. Wire bar-type supports complying with CRSI recommendations, unless otherwise indicated.
   2. For slabs on grade, supports with sand plates, or horizontal runners where base material will not support chair legs.
   3. For exposed-to-view concrete surfaces or where the concrete surface will be exposed to weather or moisture, where legs of supports are in contact with forms, supports with either hot-dipped galvanized or plastic protected legs.
   4. When supports bear directly on the ground and it is not practical to use steel bar supports, precast concrete blocks may be used to support only the bottom lift of reinforcement. The precast blocks must be solid, be of an equal or higher strength than the concrete being placed, must provide adequate support to the reinforcement, and be of proper height to provide specified reinforcing cover. The use of face bricks, hollow concrete blocks, rocks, wood blocks, or other unapproved objects will not be permitted.

D. Fibrous Reinforcing:
   1. Fibrous concrete reinforcement shall be Fibermesh 300, manufactured by Propex Concrete Systems, or equal.
   2. Reinforcement shall be 100% virgin polypropylene fibrillated, multi-length graded fiber containing no reprocessed olefin materials and specifically manufactured for use as concrete secondary reinforcement.
   3. Physical Characteristics:
      a. Specific Gravity: 0.91.
      b. Fiber Length: Multidesign gradation.

2.02 FABRICATION

A. General:
   1. Fabricate reinforcing bars to conform to required shapes and dimensions with fabrication tolerances which comply with CRSI Manual.
   2. In case of fabricating errors, do not rebend or straighten reinforcement in a manner that will injure or weaken the material.
   3. Unless otherwise shown on the drawings, all end hook dimensions shall conform with "ACI Standard Hooks."

B. Reinforcement with any of the following defects shall be deemed unacceptable and will not be permitted in the work:
   1. Bar lengths, depths, and bends exceeding specified fabrication tolerances.
   2. Bend or kinks not indicated on drawings or final shop drawings.
   3. Bar with reduced cross section because of excessive rusting or other cause.

PART 3–EXECUTION

3.01 INSPECTION

A. Examine the substrate, formwork, and the conditions under which concrete reinforcement is to be placed.

B. Correct conditions detrimental to the proper and timely completion of the work.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General:
   1. Comply with the specified standards for details and methods of placing reinforcement and supports.
   2. Clean reinforcement to remove loose rust, mill scale, earth, and other materials which reduce or destroy bond with concrete.

B. Placing Reinforcement:
   1. All reinforcing shall be placed in accordance with Contract drawings and with shop drawings stamped and approved by ENGINEER.
   2. Position, support, and secure reinforcing against displacement by formwork, construction, or concrete placement operations.
   3. Support reinforcing by metal chairs, runners, bolsters, spacers, and hangers as needed.
   4. Unless otherwise shown on the drawings, the reinforcement is to be so detailed and placed as to allow the following concrete protection:
      a. Three inches of cover where the concrete is placed directly against ground.
      b. Two inches of cover where the concrete is placed in forms but is to be exposed to weather, liquid, or the ground.
      c. One-inch cover in slabs and walls not exposed to weather, liquid, or the ground.
      d. One and one-half-inch cover in beams, girders, and columns not exposed to weather, liquid, or the ground. This cover applies to beam stirrups and column ties where applicable.
   5. Reinforcement shall be positioned within ±3/8-inch for members with depth to tension reinforcing from compression face less than or equal to 8 inches. Tolerance shall be ±1/2 inch for members with depth to tension reinforcing from compression face greater than 8 inches. Tolerance on dimension between adjacent bars in slab and wall reinforcing mats shall be 1 inch. Secure against displacement by anchoring at the supports and bar intersections with wire or clips.
   6. Bars shall be securely tied at all intersections except where spacing is less than 1 foot in each direction when alternate intersections shall be tied. To avoid interference with embedded items, bar spacing may be varied slightly if acceptable to ENGINEER. Tack welding of reinforcing will not be permitted.
   7. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
   8. If reinforcing must be cut because of openings or embedded items in the concrete, additional reinforcing must be provided adjacent to the opening at least equal in cross sectional area to that reinforcing which was cut, and it shall extend a minimum of 36 bars diameters beyond the opening on each side or as shown on the drawings. At sumps or depressions in slabs, bars shall be bent and/or extended under sumps or depressions.
   9. Wall reinforcing mats shall be secured in a vertical plane by providing clearance from forms with bar supports and by using Z-shaped bars at ±4 feet on center wired between

two mats of steel, spacing and staying both of them. Nails shall not be driven into the forms to support reinforcement and neither shall wire for this purpose come in contact with the forms. Alternate top transverse bars in slab shall be supported by individual bar chairs at approximately 3-foot 0-inch centers. Bottom longitudinal bars shall be supported by continuous bar chairs at approximately 4-foot 0-inch centers.

10. If carrier bars are to be used, CONTRACTOR shall provide reinforcing bars for this purpose in addition to the reinforcing called for by the drawings and specifications.

C. Reinforcement Supports:
   1. Strength and number of supports shall be sufficient to carry reinforcement.
   2. Do not place reinforcing bars more than 2 inches beyond the last leg of any continuous bar support.
   3. Do not use supports as bases for runways for concrete-conveying equipment and similar construction loads.

D. Welded Wire Fabric:
   1. Install welded wire fabric in as long of lengths as practicable.
   2. Lap adjoining pieces at least one full mesh.
   3. Fabric shall be supported with bar supports.

E. Splices:
   1. Provide standard reinforcement splices by lapping ends, placing bars in contact, and tightly wire tying.
   2. Lap splices in reinforcing shall be provided as shown on the drawings. Where lap splice lengths are not shown on the drawings, provide Class B, Category 1 lap splices in accordance with ACI 318.
   3. Adjacent splices of tangential bars in circular slabs and horizontal bars in circular walls shall be staggered a minimum of one full lap splice length or 3 feet, whichever is greater, unless otherwise shown. Stagger dimension shall be measured from center to center of lap splices.
   4. For circular walls, horizontal bar lap splices shall not coincide in vertical arrays more frequently than every third bar.
   5. Mechanical splices and threaded dowel bar inserts may be used where approved by ENGINEER. Splices shall be capable of developing at least 125% of the yield strength of the reinforcing bar.

F. Embedded Items:
   1. Allow other trades to install embedded items as necessary.
   2. Particularly after bottom layer of reinforcing is placed in slabs, allow electrical contractors to install conduit scheduled for encasement in slabs prior to placing upper layer of reinforcing.

G. Minimum Reinforcing: Where reinforcing is not shown, provide a minimum of No. 4 at 8-inch centers each way in members 10 inches or less in thickness and No. 5 at 12-inch centers each way in each face in members greater than 10 inches thick.

H. Fibrous Reinforcing:
   1. Fibrous concrete reinforcing shall be used in all building interior slab-on-grade concrete and all precast concrete topping, and where shown on the drawings.
   2. Add fibers at a minimum rate of 1.5 pounds per cubic yard.
   3. Mix concrete in strict accordance with reinforcement manufacturer's recommendations.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. All cast-in-place concrete as shown except as noted otherwise.
   2. PVC and hydrophilic waterstops, expansion joint fillers, bonding agents, patching mortars, curing compounds, nonshrink grout, and other related items and accessories.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. ACI 211.1–Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

B. ACI 301–Specifications for Structural Concrete.

C. ACI 304R–Guide for Measuring, Mixing, Transporting, and Placing Concrete.

D. ACI 305R–Guide to Hot Weather Concreting.

E. ACI 306R–Guide to Cold Weather Concreting.

F. ACI 308–Specification for Curing Concrete.

G. ACI 309–Guide for Consolidation of Concrete.

H. ACI 318–Building Code Requirements for Structural Concrete and Commentary.

I. ASTM C31–Standard Practice for Making and Curing Concrete Test Specimens in the Field.

J. ASTM C33–Standard Specification for Concrete Aggregates.

K. ASTM C39–Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

L. ASTM C40–Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.

M. ASTM C88-Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.

N. ASTM C94–Standard Specification for Ready-Mixed Concrete.

O. ASTM C143–Standard Test Method for Slump of Hydraulic-Cement Concrete.

P. ASTM C150–Standard Specification for Portland Cement.

Q. ASTM C156–Standard Test Method for Water Loss (from a Mortar Specimen) Through Liquid Membrane-Forming Curing Compounds for Concrete.

R. ASTM C172–Standard Practice for Sampling Freshly Mixed Concrete.

S. ASTM C231–Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

T. ASTM C260–Standard Specification for Air-Entraining Admixtures for Concrete.

U. ASTM C309–Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

V. ASTM C494–Standard Specification for Chemical Admixtures for Concrete.

W. ASTM C618–Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

X. ASTM C652–Standard Specification for Hollow Brick (Hollow Masonry Units Made From Clay or Shale).

Y. ASTM D994–Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).

Z. ASTM D1752–Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with Section 01 33 00–Submittals.

B. Submit the following information:
1. Gradation of fine and coarse aggregate–ASTM C33.
2. Specific gravity and dry rodded density of each aggregate.
3. Test of deleterious substances in fine and coarse aggregate–ASTM C33.
4. Design mix of each individual concrete mix to be used.
5. Previous test results or trial batch results with 7- and 28-day compressive strengths for each concrete mix proposed.
6. Certified mill test results for cement identifying brand, type, and chemistry of cement to be used.
7. Brand, type, principal ingredient, and amount of each admixture to be used.

C. It is important that the above data be submitted to ENGINEER well in advance of anticipated concreting operations to avoid any delay in construction.

PART 2–PRODUCTS

2.01 CEMENT

A. Cement shall be Portland cement conforming to ASTM C150. Cement used for structures exposed to wastewater, sludge, combined sewage, or sanitary sewage shall be Type II or Type I/II. All other cement shall be Type I or Type I/II. Type III cement shall be used only

when permitted by ENGINEER. All cement shall be the product of one reputable manufacturer and mill.

B. Cement shall be stored in a dry, weathertight, properly ventilated structure with the floor raised not less than 1 foot above the ground.

2.02 FLY ASH

A. All fly ash used as an admixture in Portland cement concrete shall be Class C or F conforming to the requirements of ASTM C618.

2.03 AGGREGATE

A. All aggregates shall be washed and shall consist of natural sand, gravel, or crushed rock and shall have clean, hard, durable, uncoated grains of strong minerals. The amounts of deleterious substances present in the fine and coarse aggregate expressed in percentages by weight shall not exceed the following:

	Aggregate	
Deleterious Substance	Fine	Coarse
Clay Lumps and Friable Particles	3.0	3.0
Coal and Lignite	0.5	0.5
Mineral finer than No. 200 sieve	3.0	
Soft Fragments	3.0	3.0
Chert*	---	5.0
Sum of Chert and Clay Lumps		5.0

* Material classified as chert and having a bulk specific gravity of less than 2.45. The percentage of chert shall be determined on the basis of the weight of chert in the sample retained on a 3/8-inch sieve divided by the weight of the total sample.

B. The combined amount of all deleterious substances in an aggregate shall not exceed 5% of the weight of the aggregate.

C. If required by ENGINEER, sodium sulfate soundness tests (ASTM C88) shall be performed on the aggregate. When the aggregate is subjected to 5 cycles, the weight loss shall not exceed 12%. Samples of proposed aggregates shall be submitted to an independent laboratory for testing in advance of concrete work. All testing shall be performed in accordance with ASTM C33. Certified test results shall be submitted to ENGINEER confirming that aggregate complies with all stated specifications. Report shall identify source of aggregate and absorbed water.

D. Fine aggregate shall be well-graded from coarse to fine and shall conform to the following requirements:

Percentage by Weight	
Passing 3/8-inch sieve	100
Passing No. 4 sieve	95-100
Passing No. 8 sieve	80-100
Passing No. 16 sieve	50-85
Passing No. 30 sieve	25-60

Percentage by Weight	
Passing No. 50 sieve	5-30
Passing No. 100 sieve	0-10

E. Gradation of fine aggregate shall be reasonably uniform and not subject to the extreme percentages of gradation specified above. The fineness modulus shall be not less than 2.3 or more than 3.1, nor shall the fineness modulus of any sample vary by more than +0.20 from the fineness modulus of the representative sample used in proportioning the concrete.

F. If required by ENGINEER, fine aggregate shall be subjected to the color-metric test for organic impurities (ASTM C40) and shall not produce a color darker than Figure 1, unless they pass the mortar strength test. Aggregate producing color darker than Figure 2 shall not be used in any event.

G. Coarse aggregate shall be well-graded from coarse to fine, and when tested by laboratory sieves having square openings, shall conform to the following requirements:

	Percentage by Weight Aggregate	
	3/4-inch Stone	1 1/2-inch Stone
Passing 2-inch sieve	---	100
Passing 1 1/2-inch sieve	---	90-100
Passing 1-inch sieve	100	20-55
Passing 3/4-inch sieve	90-100	0-15
Passing 3/8-inch sieve	20-55	0-5
Passing No. 4 sieve	0-10	---
Passing No. 8 sieve	0-5	---

H. The 3/4-inch aggregate shall be used in concrete members no thinner than 4 inches and less than 10 inches thick. A blend of 3/4-inch and 1 1/2-inch aggregate shall be used in members 10 inches thick and thicker with the 3/4-inch aggregate comprising between 35% and 65% of the total course aggregate. When members thinner than 10 inches are placed monolithically with members thicker than 10 inches, the aggregate requirements for the thinner member shall apply.

I. Aggregates must be allowed to drain for at least 12 hours before being used. The ground upon which aggregates are stored must be hard, firm, well-drained, and free from all vegetable matter. Various sizes of aggregates must be stored separately, and if they have become contaminated or merged with each other, they shall not be used.

2.04 WATER

A. Water used in mixing concrete shall be clean and free from injurious amounts of oil, alkali, organic matter, or other deleterious substances.

2.05 ADMIXTURES

A. Water Reducing Admixture shall be Master Pozzolith® 200 by BASF Admixtures, Inc., Daracem 19 by Grace, or equal. Water reducing admixture shall conform to ASTM C494, Type A and Type F. Water reducing admixture shall not reduce durability, shall increase strength 10%, and shall not affect bleeding characteristics over reference mix.

B. Air-Entraining Admixture shall be equal to MasterAir® AE 90 by BASF Admixtures, Inc., Darex by Grace Construction Products, or equal. Air-entraining admixture shall conform to ASTM C260.

C. No other admixture will be allowed without written approval of ENGINEER. All admixture shall be compatible with cement, aggregate, and water used.

2.06 PROPORTIONING

A. The proportions of aggregate to cement shall be such as to produce a workable mixture that can be thoroughly compacted and that will work readily in the forms and around reinforcement without permitting materials to segregate or excess water to collect on the surfaces. The combined aggregates shall be such that when separated on the No. 4 sieve, the weight passing the sieve shall not be less than 30% nor greater than 50%.

B. Concrete of various classes shall have the following maximum water/cement or water/(cement + fly ash) ratio minimum compressive strengths at 28 days and minimum cement and fly ash contents:

Class	Maximum Water/ Cement or Water/ (Cement+Fly Ash)	Minimum 28 Day Strength-Pounds per Square Inch	Cement Content-Pounds per Cubic Yard	Fly Ash-Pounds per Cubic Yard	
				Type C	Type F
AA	0.42	4,500	611	---	---
A	0.45	4,000	564	---	---
A-FA	0.45	4,000	480	110	125
B	0.53	3,500	517	---	---
C	0.53	3,000	517	---	---
X	---	2,000	376	---	---

C. Except as otherwise indicated on the drawings or specified, all concrete shall be Class A or Class A-FA concrete.

D. All concrete mixes shall be designed for a strength of 15% above that specified to allow for job variations. All mixes shall be designed in accordance with ACI 211.1 by a competent concrete engineer or competent laboratory technician. Required materials test data shall be submitted with design mixes for review and approval by ENGINEER. Mix computations shall be submitted if requested by ENGINEER.

E. The slump for all concrete shall be 3 inches and concrete with a slump within the range of 2 to 3 1/2 inches will be acceptable unless otherwise stated.

F. A water-reducing admixture shall be used in all concrete. A qualified representative of the manufacturer shall be available to assist in proportioning the concrete, advise on the proper addition of the admixture to the concrete, and advise on adjustments of concrete proportions to suit job conditions.

G. An air-entraining admixture shall be used in all concrete except as noted. Air content shall be tested by the pressure method as outlined in ASTM C231 and shall be between 4% to 7% by volume. An air-entraining admixture is not required for concrete patching and for

concrete floors, equipment pads, and supports in interior heated buildings where the concrete will be protected from freezing during and after construction.

H. CONTRACTOR shall submit to ENGINEER concrete cylinder compressive strength results from previous projects for the same concrete mixes proposed on the current project. If this information is not available, one cubic yard trial batches of each individual mix proposed for use shall be made prior to use in the work. Four test cylinders shall be made for each trial batch, two to be tested at 7 days and two at 28 days. The trial batches shall be made preceding actual placement operations so that the results of the 7-day tests can be obtained. All costs for material, equipment, and labor incurred during design of concrete mixes shall be borne by CONTRACTOR.

I. All aggregates shall be measured by weight. The concrete mixer is to be equipped with an automatic water-measuring device that can be adjusted to deliver the desired amount of water.

2.07 WATERSTOPS

A. PVC waterstops shall be as manufactured by Greenstreak, Inc., W.R. Meadows, Durajoint, or equal. Provide serrated center bulb-type, nontapered 3/8-inch minimum thickness waterstops manufactured from virgin polyvinyl chloride with no reclaimed/scrapped material or pigment whatsoever conforming to Corps of Engineers CRD-C-572. The waterstop shall have an integral fastening system consisting of hogrings or grommets. For 6-inch PVC waterstops in construction joints, use Greenstreak, Inc. Profile No. 732, or equal. For expansion joints, use Greenstreak, Inc. Profile No. 735, or equal. Where 4-inch PVC waterstops are called for in the drawings, use Greenstreak, Inc. Profile No. 702, or equal.

B. Hydrophilic waterstop shall be a flexible hydrophilic natural rubber strip composed of nonvulcanized rubber and urethane polymer hydrophilic agent creating a moisture-activated, self-healing waterproofing compound.

C. Hydrophilic waterstop shall be Adeka Ultraseal, or equal, products as follows:
   1. Construction Joints:
      a. Wall/slab thickness greater than 9 inches with double mat of reinforcing: MC-2010MN (3/4 inch by 3/8 inch) with embedded stainless steel wire mesh for expansion control. The waterstop shall develop a minimum of 400 psi expansion pressure and withstand a minimum 150-foot hydrostatic head. Expansion amount shall not exceed 120%.
      b. Wall/slab thickness between 4 inches and 9 inches with 1-inch minimum cover and single or double mat of reinforcing: KBA-1510FP (9/16 inch by 3/8 inch). Expansion amount shall not exceed 30%.
   2. Pipe Penetrations:
      a. Wall/slab thickness between 4 inches and 9 inches and pipe diameter greater than 4 inches and less than or equal to 24 inches: KBA-1510FP (9/16 inch by 3/8 inch).
      b. Wall/slab thickness greater than 9 inches and pipe diameter greater than 4 inches and less than or equal to 24 inches: MC-2005T (3/4 inches by 3/16 inches).
      c. Wall/slab thickness greater than 9 inches and pipe diameter greater than 24 inches: MC-2010MN (3/4 inch by 3/8 inch) with embedded stainless steel wire mesh for expansion control.

2.08 JOINT FILLER

A. Expansion joints shall have standard 1/2-inch-thick cork expansion joint filler, W. R. Meadows, or equal, meeting ASTM D1752–Type II. Exceptions to this are expansion joints in exterior concrete walks and between concrete walks and other structures which shall be asphalt expansion joint filler, 1/2-inch-thick, Grace, W.R. Meadows, or equal, meeting ASTM D994.

2.09 BONDING AGENT

A. Acceptable manufacturers include MasterProtect® P 110 by BASF for use in nonsubmerged applications, MasterEmaco® P 124 by BASF for submerged applications, or equal.

2.10 PATCHING ADDITIVE

A. Acceptable manufacturers include MasterEmaco® A 660 by BASF, Sonocrete by Sonneborn Contech Co., or equal.

2.11 NONSHRINK GROUT

A. Acceptable manufacturers include Dayton Superior, Master Builders, or equal. Grout shall be nonshrink, nonmetallic and shall achieve a strength of 7,500 psi in 28 days.

PART 3–EXECUTION

3.01 MIXING

A. Ready-mixed concrete shall be batched, mixed, and delivered in accordance with ASTM C94 and ACI 304R. In general, concrete shall be mixed 50 revolutions at plant, 20 upon arrival at site, and 20 each time water is added; maximum of 110 revolutions at mixing speed. Concrete shall be delivered and discharged within 1 1/2 hours or before the drum has revolved 300 times after introduction of water to the cement and aggregates or the cement to the aggregates. Truck mixers shall be equipped with drum revolution counters. In no event shall concrete which has taken its initial set be allowed to be used. Retempering of concrete is not permitted.

B. A representative of ENGINEER may be at the batching plant periodically to observe the batching and mixing.

C. No water shall be added on the job unless required by CONTRACTOR and with the knowledge of ENGINEER; the amount of water, if added, shall be recorded on all copies of the delivery tickets. If water is added, CONTRACTOR shall verify that the required water-cement ratio is not exceeded.

D. Concrete shall have a temperature not less than 60°F nor more than 80°F as delivered to the jobsite.

E. With each load of concrete, CONTRACTOR shall obtain delivery tickets and shall make these tickets available for review by ENGINEER. Delivery tickets shall provide the following information:
   1. Date.
   2. Name of ready-mix concrete plant, job location, and CONTRACTOR.
   3. Type of cement and admixtures, if any.

4. Specified cement content in sacks per cubic yard of concrete and approved concrete mix number or designation.
5. Amount of concrete in load, in cubic yards.
6. Water-cement ratio.
7. Water added at job, if any.
8. Truck number and time dispatched.
9. Number of mixing drum revolutions.

F. For job-mixed concrete, all concrete materials shall be mixed in a machine batch mixer for at least 1 1/2 minutes after all ingredients are in the mixer and shall continue until there is a uniform distribution of the materials and the mass is uniform in color and homogeneous. The mixer shall not be loaded beyond the capacity given by the manufacturer and shall be rotated at the speed recommended by the manufacturer. The mixer is to be provided with positive timing device that will positively prevent discharging the mixture until the specified mixing time has elapsed.

3.02 JOINTS

A. CONTRACTOR shall place all joints as shown on the drawings or specified herein. If approved by ENGINEER, CONTRACTOR may, at his own expense, place construction joints in addition to and at places other than those shown on the drawings. Unless otherwise shown, all joints shall be straight, truly vertical or horizontal, and proper methods shall be employed to obtain this result.

B. Where joints are not shown on the drawings or specified elsewhere, CONTRACTOR shall provide joints as follows:
1. Walls shall have vertical joints at 60 feet on center maximum but not more than 15 feet from corners or intersections and shall have horizontal joints at 15 feet on center maximum.
2. Slabs shall have joints at 20 feet on center maximum in each direction.

C. Immediately after completion of the first pour at a joint, the concrete surface, reinforcement, and waterstop projecting beyond the joint shall be thoroughly cleaned and laitance removed. The waterstops shall not be disturbed after the concrete in the first pour at a joint has set. Concrete around waterstops shall be thoroughly compacted by hand spading and vibrating. Immediately before the second pour, all extraneous matter shall be removed from the joint, the waterstop and steel cleaned, and the surface thoroughly wetted.

D. Concrete at all joints shall have been in place at least 48 hours before abutting concrete is placed. At least two hours must elapse after depositing concrete in columns or walls before depositing in beams, girders, or slab supported thereon. Beams, girders, brackets, column capital, and haunches shall be considered as part of the floor system and shall be placed integrally therewith.

3.03 WATERSTOPS

A. Unless noted otherwise, PVC waterstops shall be provided at all expansion joints and at construction joints in floors and walls of structures exposed to ground or liquid on one side and occupied by personnel or nonsubmerged equipment on the other side.

B. PVC waterstops shall be made continuous by splicing. Waterstops shall be spliced using a corner, tee, or cross splice, as applicable, at intersections. Waterstops shall be mitered to maintain the continuity of the ribs and center bulb. Splices shall be made using a hot metal plate or an electric splicer and full butt weld. Direct flame will not be allowed. Sample field-splices shall be submitted to ENGINEER for approval prior to construction.

C. PVC waterstops placed in all joints shall be securely held in place by an approved method or as shown on the drawings. PVC waterstops shall be installed and secured prior to concrete placement. PVC waterstops shall not be inserted into wet concrete. No nails will be permitted through the waterstop. Great care shall be taken when concrete is placed to ensure that the waterstop remains erect and is not bent over.

D. Either hydrophilic or PVC waterstop shall be provided at all construction joints in liquid holding tanks and channels that are not adjacent to areas occupied by personnel and at joints between new and existing concrete. Waterstop shall be placed as shown on drawing details, if any, and in accordance with the manufacturer's recommendations.

3.04 BONDING TO EXISTING CONCRETE

A. When placing new concrete adjacent to existing concrete, the existing concrete shall be thoroughly roughened, cleaned, and saturated with water 24 hours before pouring new concrete. Existing concrete is defined as concrete more than six months old. At time of new pour, remove any standing water and apply bonding agent. Bonding agent shall be applied in accordance with manufacturer's recommendations.

3.05 PATCHING EXISTING CONCRETE

A. When patching existing concrete, remove poor concrete until firm hard concrete is exposed; roughen and clean surface of the existing concrete, clean any exposed reinforcing bars, and pour new concrete. Concrete finish shall match existing concrete. New concrete shall be 4,000 psi 28-day strength mixed with patching additive, mixed according to manufacturer's instructions. Concrete shall not be air-entrained.

3.06 EMBEDDED ITEMS IN CONCRETE

A. All sleeves, inserts, anchors, and embedded items required for adjoining work or for its support shall be placed prior to concreting.

B. All contractors whose work is related to the concrete or must be supported by it shall be given ample notice and opportunity to introduce and/or furnish embedded items before the concrete is placed.

C. Embedded items shall be positioned accurately and supported against displacement. Reinforcing bars shall clear embedded items a minimum of 2 inches.

3.07 PLACING CONCRETE

A. Before placing concrete, all equipment, forms, ground, reinforcements, and other surfaces with which the concrete will come in contact are to be thoroughly cleaned of all debris, ice, and water. Ground shall be wetted prior to placement of concrete on it.

B. After reinforcement is placed and before concrete is placed over it, ENGINEER shall be allowed sufficient time to observe the reinforcing.

C. Unless otherwise authorized by ENGINEER, all concrete shall be placed in the presence of ENGINEER.

D. Concrete shall be conveyed from the mixer to the place of final deposit as rapidly as practicable by methods that will prevent the segregation or loss of materials. Chuting for conveying purposes must be accomplished in such a manner as to prevent segregation or loss of materials. Receiving hoppers shall be installed at the chute discharge and at no point

in its travel from the mixer to place of final deposit shall the concrete pass through a free vertical drop of more than 3 feet. Elephant trunks or tremies shall be used in all wall pours to prevent coating of forms and reinforcing bars.

E. Care shall be taken to avoid an excess of water on the concrete surface. Excess water shall be drained or otherwise removed from the surface. Dry cement or a mixture of cement and sand shall not be sprinkled directly on the surface to absorb water.

F. Concrete in wall and beam pours shall be deposited in approximately horizontal layers not to exceed 18 inches in thickness. Each layer shall be well worked into the preceding layer while both layers are still soft.

G. Concrete shall be deposited as nearly as practicable in its final position to avoid segregation from rehandling or flowing. The maximum allowable lateral movement of the concrete after being deposited is 3 feet. Once concreting is started, it shall be carried on as a continuous operation until the placing of the section or panel is completed.

H. All concrete shall be placed with the aid of mechanical vibrating equipment in accordance with ACI 309. In congested areas, vibration shall be supplemented by hand spading adjacent to the forms. Vibration should secure the desired results within 5 to 15 seconds at intervals of 18 inches apart maximum. The vibrator shall penetrate the preceding layer of concrete. Vibrators shall have a frequency of not less than 10,000 impulses per minute when in operation submerged in concrete.

I. A sufficient number of spare vibrators shall be kept in ready reserve to assure adequate vibration in case of breakdown of those in use.

J. In placing concrete in beams where it is intended to be continuous and monolithic with the slab above, a delay to provide for settlement of the deep concrete shall be scheduled before placing the upper concrete in the slab. The length of delay shall be as long as possible and still permit the revibration of the deep concrete.

K. Concrete is not to be placed under water. A suitable means shall be provided for lowering the water level below surfaces upon which concrete is to be placed. This may require excavating approximately 12 inches below the bottom of the concrete surface and refilling with gravel and compacting. The groundwater shall not be allowed to rise to the bottom of the concrete until 24 hours after the concrete pour has been completed. Water shall not be allowed to fall upon or run across the concrete during this period.

L. No extra payment will be allowed for dewatering, undercutting, and gravel fill.

3.08 MOIST CURING

A. All concrete shall be maintained in a moist condition for at least 7 days after being deposited except that for high-early strength concrete, a 3-day period will be sufficient. Moist curing shall be accomplished by one of the following methods:
   1. Wood forms left in place and kept wet at all times. If the forms are not going to be kept wet, they shall be removed as soon as practicable and other methods of moist curing shall be started without delay.
   2. Use of a curing compound conforming to ASTM C309, Type I as approved by ENGINEER. Curing compound shall be applied at a uniform rate as indicated by the manufacturer sufficient to comply with the requirements of the test water retention of ASTM C156. Curing compound applied to vertical concrete surfaces after forms are removed shall be specially adapted to provide required coverage on the vertical surface. On nonformed surfaces, the curing compound shall be applied immediately after the

disappearance of the water sheen after finishing of the concrete. Curing compound shall not be used on concrete surfaces that are to be painted, receive ceramic tile or resilient flooring, or be waterproofed. Care shall be taken not to get curing compound on construction joints, reinforcing steel, and other surfaces against which new concrete will be poured.

3. Use of plastic film. Plastic film shall have a minimum thickness of 4 mils. It shall be placed over the wet surface of the fresh concrete as soon as possible without marring the surface and shall be weighted so that it remains in contact with all exposed surfaces of the concrete. All joints and edges shall be lapped and weighted. Any tears in the film shall be immediately repaired.
4. Application of wet coverings weighing 9 ounces per square yard such as burlap, cotton mats, or other moisture-retaining fabrics. The covering system shall include two layers and shall be kept continuously moist so that a film of water remains on the concrete surface throughout the curing period.
5. Use of an approved waterproof curing paper. Edges of adjacent sheets shall be overlapped several inches and tightly sealed.
6. Ponding of water or continuous sprinkling of water is permitted. Sprinkling at intervals will not be permitted.
7. Construction joints shall be moist cured by one of the methods listed above except by Method "2."

B. The use of moist earth, sand, hay, or another method that may discolor hardened concrete will not be permitted.

3.09 HOT WEATHER CONCRETING

A. When the atmospheric temperature exceeds 80°F during concrete placement, this section and ACI 305 shall apply in addition to all other sections of the specifications.

B. The temperature of the delivered concrete shall not exceed 85°F.

C. Care shall be exercised to keep mixing time and elapsed time between mixing and placement at a minimum. Ready-mix trucks shall be dispatched so as to avoid delay in concrete placement, and the work shall be organized to use the concrete promptly after arrival at the jobsite.

D. The subgrade, forms, and reinforcing shall be sprinkled with cool water just prior to placement of concrete. Prior to placing concrete, there shall be no standing water or puddles on the subgrade.

E. If approved by ENGINEER, an admixture for retarding the setting of the concrete may be used.

F. Exposed concrete surfaces shall be carefully protected from drying. Continuous water curing is preferred. Curing compounds shall be white pigmented.

3.10 COLD WEATHER CONCRETING

A. Conditions of this section shall apply, in addition to all other sections of the specifications, when placing concrete in cold weather. Cold weather is defined as a period when, for more than 3 successive days, the average daily temperature drops below 40°F. When temperatures above 50°F occur during more than half of any 24-hour period, the period will no longer be regarded as cold weather. The average daily temperature is the average of the highest and lowest temperature during the period from midnight to midnight. Cold weather

concreting shall conform to all requirements of ACI 306.1, except as modified by the requirements of these specifications.

B. Detailed procedures for the production, transportation, placement, protection, curing, and temperature monitoring of concrete during cold weather shall be submitted to ENGINEER. Cold weather concreting shall not begin until these procedures have been accepted.

C. All concrete materials, forms, ground, mixing equipment, and other surfaces with which the concrete is to come in contact shall be free from frost, and the temperature of contact surfaces shall be 35°F or above. Ground upon which concrete is to be placed shall not be frozen at any depth.

D. The mixing water and aggregates shall be heated and when entering the mixer shall have temperatures not exceeding 175°F and 80°F, respectively. Concrete temperature as mixed shall not exceed 80°F and shall typically be between 55°F and 70°F. Concrete, when placed in the forms, shall have a temperature of not less than 50°F.

E. Freshly placed concrete shall be protected by adequate covering, insulating, or housing and heating. If heating is used, ambient temperature inside the housing shall be maintained at a minimum of 70°F for 3 days or 50°F for 5 days. The maximum ambient temperature during curing shall not exceed 80°F. If insulating methods are used, recommendations contained in ACI 306R shall be followed. Surface temperature shall be maintained at 50°F for 7 days. After the curing period, the temperature of the concrete shall be reduced uniformly at a rate not to exceed 40°F per 24 hours until outside air temperature is reached. Heating of enclosure shall continue if it is anticipated that the outside air temperature will drop more than 20°F in the next 24 hours. The concrete temperature shall be obtained by attaching a thermometer provided by CONTRACTOR to the concrete surface. Concrete shall be kept moist.

F. If heating is used, the housing shall be constructed weathertight and shall be constructed in a manner that will provide uniform air circulation and air temperatures over the complete concrete area that is being cured. Special attention shall be given to the edges and ends of a concrete pour with the housing extending at least 5 feet beyond any concrete surface being protected. The housing shall be in place and heat applied within 2 hours after concrete placement.

G. Heating may be by steam or hot air. Heaters shall be vented to outside of the housing. Open burning salamanders will not be permitted. Heating devices shall not be placed so close to the concrete as to cause rapid drying or discoloration from smoke.

H. If heating is used, CONTRACTOR shall provide sufficient 24-hour inspection of the heaters to ensure compliance with the above-specified temperature requirements during the curing period. CONTRACTOR shall provide maximum-minimum thermometers for ENGINEER's use.

I. The use of calcium chloride, salts, or other chemical admixtures for the prevention of freezing is prohibited.

J. Salts or other deleterious materials shall not be used on temporary or permanent structures above concrete surfaces that are being placed, finished, or cured.

3.11 FINISHING

A. Flat Work:
   1. Floated Finish: Place, consolidate, strike off, and level concrete eliminating high spots and low spots. Do not work concrete further until it is ready for floating. Begin floating with a hand float, a bladed power float equipped with float shoes, or a powered disk float when the bleed water sheen has disappeared and the surface has stiffened sufficiently to permit the operation. Immediately refloat the slab to a uniform texture.
   2. Light Troweled Finish: Float concrete surface, then power trowel the surface. Hand trowel the surface smooth and free of trowel marks.
   3. Hard Troweled Finish: Float concrete surface, then power trowel the surface. Hand trowel the surface smooth and free of trowel marks. Continue hand troweling until a ringing sound is produced as the floor is troweled.
   4. Tolerance for concrete floors shall be 1/4 inch within 10 feet in any direction. Straight edge shall be furnished by CONTRACTOR.
   5. Broom or Belt Finish: Immediately after concrete has received a floated finish, give the concrete surface a coarse transverse scored texture by drawing a broom or burlap belt across the surface.
   6. The above finishes shall be used in the following locations:
      a. Float Finish: Surface to receive roofing, waterproofing, or sand bed terrazzo.
      b. Light Troweled Finish: Submerged tank slabs.
      c. Hard Troweled Finish: Building floors.
      d. Broom or Belt Finish: Exterior slabs, sidewalks, tops of walls, and tank slabs to receive grout topping.

B. Formed Surfaces:
   1. Within 2 days after removing forms and prior to application of a curing compound, all concrete surfaces shall be observed and any poor joints, voids, stone pockets, or other defective areas shall be patched at once before the concrete is thoroughly dry. Defective areas shall be chipped away to remove all loose and partially bonded aggregate. The area shall be thoroughly wetted and filled with as dry as practical mortar mix placed to slightly overfill the recess. Mortar shall include a bonding agent. After partial set has taken place, the excess mortar shall be removed flush with the surface on the concrete using a wood float. All patching shall be cured, protected, and covered as specified for concrete. All cracks, leaks, or moist spots that appear shall be repaired. No extra compensation will be allowed CONTRACTOR for such work.
   2. The exterior or removal portion of nonremovable ties shall be removed with the use of a special tool designed for this purpose. Cutting or chipping of concrete to permit removal of exterior portion will not be permitted.
   3. For nonremovable ties, tie rod holes left by the removal of the exterior portion of the tie and cone shall be thoroughly wetted and filled by ramming with as dry as practical mortar mix in such a manner such that it completely fills the hole. Mortar shall include a bonding agent. All patching shall be cured, protected, and covered as specified for concrete. The holes are to be filled immediately after removal of the exterior portion of the tie.
   4. Holes left by removable ties shall be filled by installing a neoprene plug near the center of the wall. The balance of the hole shall be filled with mortar as specified above to within 1 inch of the face of the wall. The remainder of the hole shall be filled with a waterproofing compound.
   5. All finished or formed surfaces shall conform accurately to the shape, alignment, grades, and sections as shown or prescribed by ENGINEER. All surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness. All sharp angles, where required, shall be rounded or beveled. Any formed surface to be painted shall be free of any material that will be detrimental to the paint. The surface of the concrete shall be given one of the following finishes immediately after form stripping:

a. Finish A shall be referred to as a sack finish. Surfaces shall be free of contaminants prior to sacking. After wetting the surface, a grout shall be rubbed in using a rubber float or burlap. After the grout hardens sufficiently, it shall be scraped from the surface with the edge of a steel trowel without disturbing the grout in the air holes. After further drying, the surface shall be rubbed with burlap to remove all surface grout. The entire surface shall be finished to secure a continuous, hard, dust-free uniform texture surface free from pinholes and other minor imperfections. Finish A will be required for all unpainted surfaces (See Section 09 91 00 for painted surfaces), interior surfaces of equipment rooms, operation areas, and permanently exposed vertical surfaces. Where steel-faced forms are used to form walls, the portion of wall to receive the sack finish shall first be roughened by brush blasting or other acceptable method to achieve a texture similar to 40 to 60 grit sandpaper.
b. Finish B shall be the same as Finish A, except that the final burlap rubbing may be omitted, providing the steel trowel scraping removes the loose buildup from the surface. Finish B shall be provided for waterproof- and moistureproof-coated surfaces.
c. Finish C shall be referred to as a finish that has surface imperfections less than 3/8 inches in any dimension. Surface imperfections greater than 3/8 inches shall be repaired or removed and the affected areas neatly patched. Finish C or smoother shall be provided for interior surfaces of wet wells, tanks, and channels from 1 foot below minimum water surfaces and down and otherwise unfinished interior surfaces.
d. Finish D shall be the finish for surfaces that may be left as they come from the forms, except that tie holes shall be plugged and defects greater than 1/2 inch in any dimension shall be repaired. Finish D shall be provided for surfaces to be buried or covered by other construction such as masonry veneer.

C. All precautions shall be taken to protect the concrete from stains or abrasions, and any such damage shall be removed or repaired under this Contract.

3.12 LOADING OF CONCRETE STRUCTURES

A. No concrete structure or portion thereof shall be loaded with its design load until the concrete has obtained its specified 28-day compressive strength. This shall include but not be limited to vertical live load, equipment loading, water loading, groundwater loading, and backfill load. Concrete strength at time of loading shall be determined by testing field-cured concrete cylinders.

B. Extreme care shall be taken to ensure that construction loads do not exceed design loading of the structure.

3.13 WATER TEST

A. All liquid-retaining structures shall be water-tested by CONTRACTOR before being faced with masonry or backfilled. The structure shall be filled with water, kept full for at least 24 hours, leaks or moist areas marked, and the structure or surrounding area drained. Repairs shall be made from the face of the concrete that is subjected to water pressure. Method of repair shall be reviewed by ENGINEER.

B. Testing of the structure shall not take place until the last concrete placed in the structure has developed 28-day design strength as determined by testing field-cured concrete cylinders.

C. After repair, the structure shall again be tested as above. Testing and repair shall continue until all leaks or moist spots have disappeared. Unless otherwise stated, water for testing shall be supplied by CONTRACTOR.

3.14 NONSHRINK GROUT

A. Nonshrink, nonmetallic grout shall be used for filling recesses and pockets left for equipment installation and for setting of base plates. The material used shall be approved by ENGINEER. Store, mix, and place the nonshrinking compound as recommended by the manufacturer. The minimum compressive strength shall be 5,000 psi at age 7 days and 7,500 psi at age 28 days.

3.15 TESTING AND SAMPLING

A. The following tests of fresh concrete shall be performed by CONTRACTOR. CONTRACTOR shall prepare, protect, transport, and have tested all cylinders at his expense.
   1. Sampling of concrete for slump tests, air tests, temperature tests, and for making concrete test cylinders shall be performed in accordance with ASTM C172.
   2. Cylinders:
      a. Three test cylinders shall be made for each pour less than 25 cubic yards, four test cylinders shall be made for each pour between 25 and 100 cubic yards, and eight test cylinders shall be made for each pour in excess of 100 cubic yards. Each concrete mix shall be represented by at least four cylinders for the entire job. Concrete for cylinders shall be collected near the middle of the load and/or as requested by ENGINEER.
      b. Cylinders shall be made and tested in accordance with ASTM C31 and ASTM C39, respectively. The cylinders must be kept moist and at temperatures between 60°F and 80°F and shall remain undisturbed and stored in a location free from vibration. In hot weather, the cylinders shall be covered with wet burlap and stored in a shaded area. It is CONTRACTOR's responsibility to provide a suitable protected location for storing cylinders on the jobsite.
      c. After 24 hours, the cylinders shall be transferred to an independent testing laboratory acceptable to OWNER. The cylinders shall be packed in sawdust or other cushioning material for transit to avoid any bumping or jarring of the cylinders.
      d. Cylinders shall be broken at 7 and 28 days or as requested by ENGINEER. Test results shall be mailed immediately and directly to ENGINEER. Test data shall include date and location of pour and concrete mix used.
   3. Slump Test: CONTRACTOR shall make one slump test near the beginning of all pours with two tests being made for all pours in excess of 25 yards or as requested by ENGINEER. Slump tests shall conform to ASTM C143.
   4. Air Test:
      a. When air-entrained concrete is used, the air content shall be checked by CONTRACTOR near the beginning of all pours with at least two checks being made for all pours in excess of 25 cubic yards, or as requested by ENGINEER.
      b. The air contents shall be checked using the pressure method in accordance with ASTM C231. The pocket-sized alcohol air indicator shall not be used unless it is first used in conjunction with the pressure method test.

B. All costs of additional testing and sampling of fresh or hardened concrete needed because of suspected or actual violation of the specifications shall be borne by CONTRACTOR.

3.16 RECORDS

A. A record is to be kept of all concrete work. The record shall include the date, location of pour, concrete mix, slump, air content, test cylinder identification, concrete temperature, and ambient air temperature. In addition, for cold weather concreting the record shall include the daily maximum-minimum thermometer readings of all thermometers during the entire curing period for all concrete pours. The project representative will keep this record, and CONTRACTOR shall assist in obtaining needed information.

3.17 SIDEWALKS AND EXTERIOR SLABS

A. Sidewalks shall be constructed where shown on the drawings. They shall be a minimum of 5 inches thick and shall slope away from buildings or structures at a rate of 1/4 inch per foot. Concrete shall be as previously specified. Sidewalks shall be constructed on 3 inches of compacted granular fill. They shall have tooled joints of 1-inch minimum depth at approximately 5-foot centers with 1/2-inch preformed expansion joint filler at approximately 25-foot centers with one at all corners and located anywhere sidewalks abut structures and buildings.

3.18 CONCRETE REMOVAL AND PATCHING

A. All areas disturbed as a result of concrete removal or repair shall be patched as specified in Bonding to Existing Concrete.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Shop-fabricated carbon steel, stainless steel, and aluminum items.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. ASTM A36–Carbon Structural Steel.

B. ASTM A53–Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

C. ASTM A123–Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

D. ASTM A143–Practice for Safeguarding Against Embrittlement of Hot-Dipped Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

E. ASTM A153–Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

F. ASTM A176–Specification for Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip.

G. ASTM A276–Stainless Steel Bars and Shapes.

H. ASTM A307–Carbon Steel Bolts, Studs, and Threaded Rod 60,000 psi Tensile Strength.

I. ASTM A384–Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.

J. ASTM A385–Practice for Providing High-Quality Zinc Coatings (Hot-Dip).

K. ASTM A500–Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

L. ASTM A780–Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

M. ASTM A992–Structural Steel Shapes.

N. ASTM A1008–Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

O. ASTM A1011–Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

P. ASTM B209–Aluminum and Aluminum-Alloy Sheet and Plate.

Q. ASTM B211–Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire.

R. ASTM B221–Aluminum and-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.

S. AWS A2.0–Standard Symbols for Welding, Brazing, and Nondestructive Examination.

T. AWS A5.4–Stainless Steel Electrodes for Shielded Metal Arc Welding.

U. AWS D1.1–Structural Welding Code–Steel.

V. AWS D1.2–Structural Welding Code–Aluminum.

W. AWS D1.6–Structural Welding Code–Stainless Steel.

1.03 DESIGN REQUIREMENTS

A. All fabrications shall meet applicable code requirements including OSHA.

1.04 SUBMITTALS FOR REVIEW

A. Comply with pertinent provisions of Section 01 33 00–Submittals.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, sections, elevations, and details where applicable.

C. Mill Test Reports: Submit indicating structural strength and composition.

D. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

1.05 QUALITY ASSURANCE

A. Fabricate steel members in accordance with AISC Code of Standard Practice.

B. Welders Certificates: Certify welders employed on the work, verifying AWS qualification within the previous 12 months.

1.06 QUALIFICATIONS

A. Qualify welding processes and welding operators in accordance with AWS *Standard Qualifications Procedures*.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver all materials to job site properly marked to identify the structure for which it is intended and at such intervals to ensure uninterrupted progress of the work. Marking shall correspond to markings indicated on the shop drawings.

B. Store all members off the ground using pallets, platforms, or other supports.

C. Do not store materials on the structure in a manner that might cause distortion or damage to the members of the supporting structures.

D. In the event of damage, immediately make all repairs and replacements necessary at no additional cost to OWNER.

PART 2–PRODUCTS

2.01 MATERIALS–CARBON STEEL

A. Steel Sections:
   1. ASTM A36 (channels, angles, plates).
   2. ASTM A992 (wide flange sections).
   3. Pipe: ASTM A53, Grade B.
   4. Tubes: ASTM A500, Grade B.
   5. Silicon content of steel members to be hot-dipped galvanized shall be in the range of 0 to 0.04%. Submit mill test reports confirming compliance.

B. Sheet Steel: ASTM A1011.

C. Plain Washers: Round carbon steel complying with FS FF-W-92.

D. Bolts and Nuts: ASTM A307 Grade A, or galvanized to ASTM A153 for galvanized components for exterior use and where built into exterior walls.

E. Lock Washers: Helical spring-type carbon steel complying with FS FF-W-84.

F. Welding Electrodes: Comply with AWS D1.1. E70XX electrodes for carbon steel. For ASTM A992 steel and any other steel with 50 ksi or greater yield strength, use only E7018 or other E70XX electrodes specifically permitted by AWS D1.1.

G. Select fasteners for the type, grade, and class required.

2.02 MATERIALS–STAINLESS STEEL

A. Unless otherwise noted, all stainless steel shall meet the requirements of ASTM A276 and shall be Type 316L.

B. If components are not available in Type 316L, other 300 Series type shall be used as approved by ENGINEER.

C. Welding Electrodes:
   1. Comply with AWS D1.6.
   2. Use ER316L electrodes for 316L stainless steel.
   3. Use ER308L electrodes for 304L stainless steel.

2.03 MATERIALS–ALUMINUM

A. Extruded Aluminum: ASTM B221, Alloy 6061, Temper T6.

B. Sheet Aluminum: ASTM B209, Alloy 3005.

C. Aluminum-Alloy Bars: ASTM B211, Alloy 6061, Temper T6.

D. Bolts, Nuts, and Washers: Stainless steel.

E. Welding Materials: AWS D1.2; type required for materials being welded.

2.04 FABRICATION

A. Fabrication and Assembly:
   1. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on the approved shop drawings.
   2. Properly mark and match-mark materials for field assembly and for identification as to structure and site for which intended.
   3. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
   4. Where finishing is required, complete the assembly, including welding of units, before start of finishing operation.
   5. Provide finish surfaces of members exposed in the final structure free of markings, burrs, and other defects.

B. Connections:
   1. Bolts and washers of all types and sizes shall be provided for completion of all field erection.
   2. Comply with AWS Code for procedures, appearance, and quality of welds used in correcting welded work.
   3. Assemble and weld built-up sections to produce true alignment of axes without warp.
   4. Welding shall be done by the shielded arc process.
   5. All welds shall be chipped, ground smooth, and primed immediately after fabrication.

C. Workmanship:
   1. Use materials of size and thickness shown or, if not shown, of size and thickness to produce strength and durability in the finished product.
   2. Work to dimensions shown or accepted on the Shop drawings using proven details of fabrication and support.
   3. Form exposed work true to line and level, with accurate angles and surfaces, and with straight sharp edges.
   4. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing works.
   5. Cap all open ends of pipe and structural tubing.

6. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush; match and blend with adjoining surfaces.
7. Provide for anchorage of the type shown. Coordinate with supporting structures. Fabricate and space the anchoring devices to provide adequate support for intended use.
8. Cut, reinforce, drill, and tap miscellaneous metal work as indicated to receive hardware and similar items.

2.05 FINISHES

A. Carbon steel surfaces shall be prepared by abrasive blasting to SSPC-SP10 as specified in Section 09 91 00–Painting.

B. Do not prime surfaces where galvanizing or field welding is required.

C. Immediately after surface preparation, prime paint carbon steel items with one coat in accordance with manufacturer's instructions and Section 09 91 00–Painting.

D. Structural Steel Members: Galvanize after fabrication to the requirements in this section and ASTM A123.

E. Surfaces that will be inaccessible after assembly or erection shall be finish painted prior to assembly or erection.

F. Galvanizing:
1. All items, except piping designated to be galvanized, shall be hot-dipped galvanized in accordance with ASTM Specification A123 and A153. Piping shall be hot-dipped galvanized in accordance with ASTM A53. Furnish a Certificate of Compliance stating that the galvanizing complies with ASTM Specifications and Standards and all other applicable requirements specified herein.
2. Fabrication of items to be galvanized shall be in accordance with ASTM A143, A384, and A385. Structural steel shall be fabricated generally in accordance with Class 1 guidelines as shown in *Recommended Details for Galvanized Structures* as published by the American Hot Dip Galvanizer's Association, Inc.
3. Galvanized items shall be handled, transported, and stored to prevent damage or staining to the coating. Maintain adequate ventilation and continuous drainage.
4. Silicon content for steel to be hot-dipped galvanized shall be in the range of 0 to 0.04%.
5. Steel work shall be precleaned utilizing a caustic bath, acid pickle and flux, or shall be blast cleaned and fluxed. In either case, all surface contaminants and coatings shall be removed.
6. All welding shall be performed in accordance with the American Welding Society publication D19.0-72, *Welding Zinc Coated Steel*. All uncoated weld areas shall be touched up.

G. Aluminum shall have a mill finish unless otherwise specified. Any aluminum in contact with concrete or dissimilar metal shall be coated with multiple coats of bituminous paint, minimum 10 mils dry.

PART 3–EXECUTION

3.01 EXAMINATION

A. Correct conditions detrimental to the proper and timely completion of the work.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorages such as concrete inserts, anchor bolts, and miscellaneous items having integral anchors which are to be embedded in concrete construction.

B. Coordinate delivery of such items to project.

C. Clean and strip primed steel items to bare metal where site welding is required.

3.03 INSTALLATION

A. Setting Precast Anchorages:
   1. Clean bearing surfaces free from bond-reducing materials, and roughen to improve bond to surfaces. Clean the bottom surface of bearing plates.
   2. After the bearing members have been positioned and plumbed, tighten and anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.
   3. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

B. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction including threaded fasteners for concrete inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.

C. Cutting, Fitting, and Placement:
   1. Perform cutting, drilling, and fitting for installation of miscellaneous metal fabrications.
   2. Set work accurately in location, alignment, and elevation and make plumb, level, true, and free from rack measured from established lines and levels.
   3. Fit exposed connections accurately together to form tight hairline joints.
   4. Weld connections that are not to be left as exposed joints, grind joints smooth, and touchup shop paint coat or galvanizing repair.

3.04 FIELD WELDING

A. Comply with AWS Code for procedures of manual shielded metal arc welding (steel, stainless steel) and gas metal arc welding (aluminum), appearance and quality of weld made, and methods in correcting welding work.

3.05 TOUCH-UP PAINTING

A. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting in accordance with Section 09 91 00–Painting.

3.06 GALVANIZING REPAIR

A. Areas damaged by welding, flame-cutting, or during handling, transport, or erection shall be repaired by one of the following methods whenever damage exceeds 3/16 inch in width.
   1. Cold Galvanizing Compound:
      a. Surfaces to be reconditioned with zinc-rich paint shall be clean, dry, and free of oil, grease, and corrosion products.
      b. Areas to be repaired shall be power disc-sanded to bright metal. To ensure that a smooth reconditioned coating can be effected, surface preparation shall extend into the undamaged galvanized coating.
      c. Touch-up paint shall be an organic cold-galvanized compound having a minimum of 94% zinc dust in the dry film.
      d. The paint shall be spray- or brush-applied in multiple coats until a dry film thickness of 8 mils minimum has been achieved. A finish coat of aluminum paint shall be applied to provide a color blend with the surrounding galvanizing.
      e. Coating thickness shall be verified by measurements with a magnetic or electromagnetic gauge.
   2. Zinc-Based Solder:
      a. Surfaces to be reconditioned with zinc-based solder shall be clean, dry, and free of oil, grease, and corrosion products.
      b. Areas to be repaired shall be wire-brushed.
      c. Heat shall be applied slowly and broadly close to but not directly onto the area to be repaired. The zinc-based solder rod shall be rubbed onto the heated metal until the rod begins to melt. A flexible blade or wire brush shall be used to spread the melt over the area to be covered. The zinc-based solder shall be applied in a minimum thickness of 2 mils.
      d. Coating thickness shall be verified by measurements with a magnetic or electromagnetic gauge.

3.07 SCHEDULE

A. The following schedule is a list of principal items only. Refer to Drawing details for items not specifically scheduled.

B. Guard Posts: Steel pipe, concrete-filled, crowned cap, as detailed-galvanized and field finish paint in accordance with Division 09.

END OF SECTION

SECTION 05 53 00

GRATING, FLOOR PLATES, AND FLOOR PLANK

PART 1–GENERAL

1.01 SUMMARY

A. Work includes floor grating and aluminum floor plank.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. ASTM A123–Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

B. NAAMM Metal Bar Grating Manual ANSI NAAMM MBG531 and MBG532.

C. ASTM B221-Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.03 PERFORMANCE REQUIREMENTS

A. Floor grating shall be designed for a maximum deflection of 1/4 inch when supporting a 100 psf uniform load.

1.04 FIELD MEASUREMENTS

A. Take all field measurements prior to preparation of shop drawings. Verify that field measurements are as indicated on shop drawings.

PART 2–PRODUCTS

2.01 ALUMINUM FLOOR GRATING

A. All grating, unless otherwise specified, shall be rectangular bar style, swage-locked aluminum floor grating with serrated surface.

B. Acceptable manufacturers include the following or equal: Harsco Industrial, IKG Type S-19-4-BS.

C. All edges of the grating and all openings in the grating for pipe and miscellaneous equipment shall be banded by welding on minimum 1/8-inch-thick bars. The band shall have less depth than the bearing bars to permit drainage.

D. Individual sections shall be of a size to permit ease in handling with a maximum length not in excess of 8 feet. Weight of individual sections shall not exceed 75 pounds.

E. Where possible, provide a 12-inch-wide section of grating over each stop gate and over each valve operating nut.

F. All aluminum grating support angles shall be aluminum. Support angles shall be provided at the bearing ends of all grating. This includes locations such as wall openings and corners. Support angles shall also be provided at the nonbearing ends of grating where shown on the drawings.

G. Provide 4-inch by 1/4-inch toeboards anchored to edge of grating at all slide gates in grated areas.

H. Where shown on the drawings, provide hinged opening in grating. All edges of opening shall be banded and supported as required.

2.02 ALUMINUM FLOOR PLANK

A. Aluminum plank shall be unpunched heavy duty plank as manufactured by Ohio Gratings, Inc., or equal.

B. Plank shall have a striated top surface to increase slip-resistance.

C. Grating type unpunched Aluminum Heavy Duty Plank (plain sides): Six-inch-wide extruded aluminum plank with support bars spaced 1.2 inches on center, fabricated with banding into panels of standard width to fill areas shown on the drawings. Plank Depth: based on loading requirements and clear span.

D. Fabricate cutouts in plank sections for penetrations indicated. Arrange cutouts to permit plank removal without disturbing items penetrating plank. Band ends and cuts in plank with 3/16-inch-thick bars of same depth as the plank.

E. Materials: Plank and banding shall be aluminum type 6063-T6.

F. Provide aluminum hinged access doors as shown on drawing. Access doors shall be made of minimum 1/4-inch-thick aluminum plate with stainless steel hinges and recessed lifting handle. Provide additional aluminum framing around opening as required.

G. Fabrication Tolerances shall be in accordance with ANSI/NAAMM MBG 531-09 Metal Bar Grating Manual.

H. Finish: Gratings shall be Mill finish.

I. Provide stainless steel ADA plank lug fasteners at each end of plank into supports.

J. Individual sections of plank shall be of a size to permit ease in handling with a maximum length not in excess of 8 feet. Weight of individual sections shall not exceed 75 pounds.

K. All aluminum plank support angles shall be aluminum. Support angles shall be provided at the bearing ends of all plank. This includes locations such as wall openings and corners. Support angles shall also be provided at the nonbearing ends of grating where shown on the drawings.

L. Provide 4-inch by 1/4-inch toeboards anchored to edge of plank at all slide gates in plank areas.

M. Where possible, provide a 12-inch-wide section of planking over each stop gate.

N. Provide one 1 1/4-inch finger hole centered along each bearing end of each plank panel. Locate hole 2 inches from end of panel. Provide PVC or rubber plugs for holes.

O. Where existing grating is to be replaced with planking, match the thickness of the new planking to the existing grating being replaced.

2.03 FINISHES

A. Protection of Aluminum from Dissimilar Materials:
   1. Where aluminum surfaces come into contact with dissimilar metals, surfaces shall be kept from direct contact by painting the dissimilar metal with multiple coats of bituminous paint, minimum 10 mils dry, or other approved insulating material.
   2. Where aluminum surfaces come into contact with dissimilar materials such as concrete, masonry, or lime mortar, exposed aluminum surfaces shall be painted with multiple coats of bituminous paint, minimum 10 mils dry, or other approved insulating material.

PART 3–EXECUTION

3.01 EXAMINATION

A. Verify that opening sizes and dimensional tolerances are acceptable.

B. Prior to installation, CONTRACTOR shall inspect supports for correct size, layout, and alignment. Any inconsistencies between contract drawings and supporting structure deemed detrimental to placement shall be reported in writing to ENGINEER prior to placement.

3.02 INSTALLATION

A. Place embedded frames and supports in correct position, plumb and level. Provide blocking as required to maintain alignment of sections.

B. Seal small gaps between embedded angles at face of wall with backer rod to prevent concrete entry.

C. All aluminum floor grating shall be secured to supporting members with aluminum or stainless steel saddle clips supplied by the grating manufacturers. Stud bolts and other hardware shall be supplied by CONTRACTOR.

D. Install in accordance with shop drawings and standard installation clearances as recommended by the NAAMM Metal Bar Grating Manual.

E. Cutting, Filling, and Placement:
   1. Perform all cutting and fitting required for installation.
   2. Cutouts for circular obstructions are to be at least 2 inches larger in diameter than the obstruction. Cutouts for all piping 4 inches or less shall be made in the field.
   3. All rectangular cutouts are to be made to the next bearing bar beyond the penetration with a clearance not to exceed bearing bar spacing.
   4. Utilize standard panel widths wherever possible.

END OF SECTION

SECTION 05 56 00

ANCHOR BOLTS AND POST-INSTALLED ANCHORS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Anchor bolts, expansion bolts, adhesive anchors, and screw anchors.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. ASTM A36/A36M–Standard Specification for Carbon Structural Steel.

B. ASTM F1554–Anchor Bolts, Steel, 36, 55, and 105-ksi yield strength.

C. ICC-ES International Code Council–Evaluation Service.

D. AC 193–Acceptance Criteria for Mechanical Anchors in Concrete Elements.

E. AC 308–Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete.

F. ACI 355.2–Qualification of Post-Installed Mechanical Anchors in Concrete and Commentary.

G. ACI 355.4–Qualification of Post-Installed Adhesive Anchors in Concrete and Commentary.

PART 2–PRODUCTS

2.01 ANCHOR BOLTS

A. Anchor bolts complete with washers and nuts shall be fabricated as shown or as specified by the equipment manufacturer and unless otherwise indicated shall be hot-dip galvanized carbon steel or 316 stainless steel. Anchor bolts shall, as a minimum, conform to the requirements of ASTM F1554-Grade 36.

B. Stainless steel anchor bolts shall be used in all submerged locations, below final grade, and in contact with aluminum and other items not to be painted. Galvanized anchor bolts shall be used elsewhere.

2.02 EXPANSION BOLTS

A. Expansion bolts shall be KWIK Bolt TZ by Hilti, Inc., TruBolt+ by ITW Red Head, Power-Stud+ SD2, SD4, or SD6 by DeWalt, Strong-Bolt or Strong-Bolt 2 by Simpson Strong-Tie Anchor Systems, or approved equal.

B. All expansion bolts shall comply with the 2013 Kentucky Building Code, AC 193, and ACI 355.2. They shall be ICC-ES approved for use in cracked and uncracked concrete.

C. Expansion bolts will not be permitted as substitutes for embedded anchor bolts except with the prior written acceptance of ENGINEER or where otherwise specifically called for.

D. Unless indicated otherwise on the drawings or specified, use the following bolt material for the various installation situations:
   1. Stainless Steel: For all submerged locations, below final grade, and in contact with aluminum appurtenances and other items not to be painted. Also for anchoring equipment, unless otherwise specified.
   2. Steel: In other locations in contact with items to be painted or encased in concrete.

2.03 ADHESIVE ANCHORS

A. Adhesive anchors shall be HIT HY 200 by Hilti, Inc., Red Head Epcon C6+ or Red Head Epcon S7 by ITW, Pure 110+ or AC200+ by DeWalt, Set-XP by Simpson Strong-Tie Anchor Systems, or approved equal.

B. All adhesive anchors shall comply with the 2013 Kentucky Building Code, AC 308, and ACI 355.4. They shall be ICC-ES approved for use in cracked and uncracked concrete.

2.04 SCREW ANCHORS

A. Screw anchors shall be KWIK HUS-EZ by Hilti, Inc., Screw-Bolt by DeWalt, Titen-HD by Simpson Strong-Tie Anchor Systems, or approved equal.

B. All screw anchors shall comply with the 2013 Kentucky Building Code. They shall be ICC-ES approved for use in cracked and uncracked concrete.

PART 3–EXECUTION

3.01 ANCHOR BOLTS

A. Anchor bolts for structural members shall be located as shown and specified.

B. Anchor bolts for mechanical equipment shall have embedment length, edge distances, and spacing as required by the equipment manufacturer.

C. All dirt or foreign materials shall be removed prior to embedding into concrete. After anchor bolts have been embedded, their threads shall be protected by grease and by installing the nuts or by other means until the time of installation of the equipment or metal work.

3.02 EXPANSION BOLTS

A. Unless otherwise noted on the drawings, expansion bolt edge distance and spacing shall be in accordance with manufacturer's printed installation instructions.

B. Bolt embedment shall at least equal 6-bolt diameters.

C. Installation procedures shall be in accordance with the manufacturer's printed installation instructions.

D. Where location of bolts is adjustable, reinforcing steel shall be located prior to drilling holes and bolts shall be located to clear reinforcing steel.

3.03 ADHESIVE ANCHORS

A. At locations shown on the drawings, reinforcing bars or threaded rod shall be provided in existing concrete by drilling holes, injecting epoxy adhesive, and inserting the reinforcing bar.

B. All existing surfaces to receive adhesive anchors, including the entire area in contact with the new concrete, shall be cleaned and roughened to amplitude of 1/4 inch.

C. Installation procedures shall be in accordance with the manufacturer's printed installation instructions.

D. Where location of anchors is adjustable, reinforcing steel shall be located prior to drilling holes and anchors shall be located to clear reinforcing steel.

E. CONTRACTOR shall arrange an anchor manufacturer's representative to provide on-site installation training for installation of their adhesive anchor system products. Submit documentation that all CONTRACTOR's personnel or subcontractors who install adhesive anchors have been trained prior to the announcement of anchor installation.

F. Adhesive anchors in horizontal and upwardly inclined orientations to resist sustained tension loads are subject to the following requirements:
   1. They shall be installed by personnel certified by an applicable certification program. Certification shall include written and performance tests in accordance with the ACI/CRSI Adhesive Anchor Installer Certification program, or equivalent, as approved by ENGINEER.
   2. They require continuous special inspection during installation. CONTRACTOR shall notify ENGINEER and Special Inspector of the schedule for these anchor installations to permit coordination of inspections.

3.04 SCREW ANCHORS

A. Unless otherwise noted on the drawings, screw anchor edge distance and spacing shall be in accordance with manufacturer's recommendations.

B. Anchor embedment shall at least equal 6-bolt diameters.

C. Installation procedures shall be in accordance with the manufacturer's printed installation instructions.

D. Where location of anchors is adjustable, reinforcing steel shall be located prior to drilling holes and anchors shall be located to clear reinforcing steel.

END OF SECTION

SECTION 05 59 00

ROOFTOP SUPPORT SYSTEMS

PART 1–GENERAL

1.01 SECTION INCLUDES

A. The work covered by this specification consists of furnishing all labor, equipment, materials and accessories, and performing all operations required for the correct installation of rooftop pipe/ductwork supports, walkways, crossovers, stairs and platforms.

1.02 REFERENCES

A. ASTM A653 G90 SS Gr. 33–Specification for Steel Sheet, Zinc Coated (Galvanized) by the Hot Dipped Process.

B. ASTM B633–Specification for Electrodeposited Coatings of Zinc on Iron and Steel.

C. ASTM A 123/A 123M–Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

D. ASTM A 153/A 153M–Standard Specification for Zinc Coating (Hot-Dip Galvanized) on Iron and Steel Hardware.

E. ASTM D 1929–Standard Test Method for Determining Ignition Temperature of Plastics.

F. MSS SP-58–Pipe Hangers and Supports–Materials, Design and Manufacture; Manufacturers Standardization Society of the Valve and Fittings Industry.

G. MSS SP-69–Pipe Hangers and Supports–Selection and Application; Manufacturers Standardization Society of the Valve and Fittings Industry.

1.03 QUALITY ASSURANCE

A. Pipe supports, walkway and crossover systems shall be manufactured under a quality control program assuring quality product delivered to the jobsite. Support systems that are damaged shall not be installed. Systems shall be designed and detailed by supplier or manufacturer.

B. Manufacturer Qualifications: must be a company specializing in manufacturing roof top pipe support systems and rooftop walkway systems with a minimum of 20 years of documented experience.

C. Workmanship: All supports to be installed by a qualified contractor and installed in accordance with manufacturer's recommendations.
   1. All work shall comply with all applicable federal, state, and local codes and laws having jurisdiction.
   2. All work shall conform to accepted industry and trade standards for pipe Support installations.

1.04 SUBMITTALS

A. Submit under provisions of section 01 33 00.

B. Drawings: Will show dimensions of product.

C. Layout: Will show overview of layout, spacing and details of installation.

D. Alternate to specified product must be submitted 7 days before bid date for approval.

1.05 WARRANTY

A. Warranty: Supplier shall guarantee to repair or replace at its option any products it finds to be structurally defective in material or workmanship for a period of five (5) years from date of delivery to purchaser. Such warranty specifically excludes repair of non-structural rust damage to products. Obligation with respect to material found to be defective shall be limited to replacement or repair and in no event shall supplier be liable for transportation to or from our factory, installation, adjustments or any expenses or damages arising in connection with such material. No warranty expressed or implied shall cover defects caused by outside contractors/installers of the Supplier's system.

PART 2–PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with these specifications, support systems shall be PHP Systems design as supplied by PHP Systems/Design 5534 Harvey Wilson DR, Houston, TX 77020 Tel: 713-672-5088 email: info@phpsd.com website: www.phpsd.com, or equal.

2.02 MATERIALS

A. Bases are high density polypropylene with UV inhibitors and anti-oxidants conforming to following:
   1. Color: Black color as molded.
   2. Moisture Content: negligible.
   3. Shrinking/Swelling due to moisture: Negligible.
   4. Resistant to oil, gasoline, antifreeze, battery acid and sulfuric acid.
   5. Do not use bases that are made of pressed rubber, steel, stainless steel, recycled tires or carbonated plastics.
      a. Base Dimensions:
         (1) 18-inches wide by 18-inches long by 3-inches tall (18x18).
         (2) 12-inches wide by 12-inches long by 3-inches tall (12x12).
         (3) 10-inches wide by 16-inches long by 3-inches tall (PP10).
         (4) 8-inches wide by 10-inches long by 2.5-inches tall (SS8).
         (5) 18-inches round by 3-inches tall (18 round).

B. Steel frame: Steel, 12ga 1-5/8-inch or 1-7/8-inch strut galvanized per ASTM A123 or 14ga 13/16-inch strut galvanized per ASTM A653 for PP10 and SS8.

C. Hanger Type:
   1. Conforms to MSS SP-58 and MSS SP-69.
   2. Material: Carbon steel(Standard); 304 SS available.
   3. Clevis Hanger: Used for all insulated and uninsulated lines.
   4. Roller Hanger: Used for uninsulated lines.
   5. Finish: HDG.

D. Walkway Surface:
   1. Interlocking Planking:
      a. Thickness: 18 gauge.
      b. Section width: 12 inches standard, or 6 inches.
      c. Planking height: 2.5 inches.
      d. Flange options: MM/MF.
      e. Surface: Slip resistant.
      f. Finish: HDG.
   2. Bar Grating: Type WB-4.
      a. 1 inch by 3/16-inch Bearing Bars, 1-3/16 inches on Center, Regular Cross Bars 4 inches.
      b. Width: 24 inches(standard), or 36 inches–as required.
      c. Surface: Serrated.
      d. Finish: HDG.

E. Handrail: 12 gauge, 1-5/8 inch strut, Galvanized.

F. Attaching hardware: HDG threaded rod, nuts and attaching hardware per ASTM A153.

2.03 TYPE OF ROOFTOP SUPPORTS

A. PHP Duct Support(Goal Post/Enclosed)–model is designed to support any size of square or round duct at most any specified height above the roof surface.
   1. Support Spacing subject to local codes and authorities but will not exceed 10 feet and shall be generally located off existing roof with spacings between 4 to 6 feet on center.
   2. Bracing required when using base with swivel, when duct exceeds 24 inches above roof.

B. Elevated Walkway/Crossover/Stair/Access Platform–used to enhance safety and flow of rooftop traffic. All walkway systems are installed directly on the roof without penetrating the roof surface. Systems allow technicians and service professionals to gain safe and convenient access to varying roof levels and equipment otherwise encumbered by rooftop pipes, ducts, and other types of rooftop components.

PART 3–EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions and recommendations.

B. If gravel top roof, gravel must be removed around and under support base.

C. Always consult roofing manufacturer for roof membrane compression capacities. If necessary, a compatible sheet of roofing material (rubber pad) may be installed under rooftop support to disperse concentrated loads and add further membrane protection.

D. Pipe spacing subject to local authorities and codes but will not exceed 10 feet.

END OF SECTION

SECTION 06 82 00

FRP WALL PANEL SYSTEMS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: FRP laminated composite wall panels and trim.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. ASTM E84-Standard Test Method for Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS

A. Submittals shall be in accordance with provisions of Section 01 33 00.

1.04 REGULATORY REQUIREMENTS

A. Conform to the International Building Code 2012 for fire-rated assemblies.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles, bearing brand name and identification of manufacturer or supplier.

B. Store materials inside, under cover, and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Damaged or deteriorated material shall be removed from premises.

PART 2–PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Acceptable manufacturers include the following, or equal: Crane Composites.

2.02 MATERIALS

A. FRP Laminated Composite Wall Panels:
   1. Provide Kemply wall and ceiling panels with Glasbord-P FRP facing panel laminated to one side of a 5/8-inch-thick plywood substrate. FRP facing panel shall be 0.09 inch thick and have an embossed surface and Surfaseal finish. Panel size shall be 48 inches by 96 inches.
   2. Provide trim pieces of similar material at all corners, openings, and joints in panels as required to provide a finished wall and ceiling surface.

3. Panels shall meet Class C flame spread and smoke development ratings per ASTM E84. Color to be chosen by OWNER.

PART 3–EXECUTION

3.01 INSTALLATION

A. Coordinate panel layouts with light electrical and mechanical drawings.

B. Manufacturer's FRP trim shall be installed at the perimeter of the ceiling, at the face of all openings and of other locations as required for a finished installation.

C. FRP laminated composite wall panel systems shall be installed per manufacturer's recommendations. Install over batt insulation and vapor barrier where noted on drawings. Provide FRP manufacturer's trim and accessories for a finished addition.

3.02 CLEANING AND ADJUSTING

A. Remove and replace units which are damaged or improperly installed.

B. Following installation, clean soiled or discolored surfaces of units.

END OF SECTION

SECTION 07 90 00

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 01 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 01 33 00–Submittals.

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 weathertight and guaranteed watertight by installer for 2 years from the earlier of either the date established for partial utilization in accordance with General Conditions, as modified in the Supplementary Conditions or Substantial Completion of the project. Deliver original guarantee to OWNER with copies to ENGINEER.

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

PART 2–PRODUCTS

2.01 CAULK–NONSUBMERGED APPLICATIONS–GENERAL

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

B. Acceptable products include the following, or equal:
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–SUBMERGED APPLICATIONS–GENERAL

A. Caulk in all submerged applications except at potable water contact shall be a two-part, polysulfide base synthetic rubber sealant.

B. Acceptable products include the following, or equal:
   1. Sonolastic Polysulfide Sealant by BASF Construction Chemicals, LLC.
   2. Thiokol 2235M by PolySpec.

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(s) shall be used where required by the manufacturer for the specific product(s) used and the specific application(s) intended. Specific product(s) shall be as recommended by the manufacturer.

C. Cleaning fluid shall be methyl ethyl ketone (MEK), methyl isopropyl ketone (MIK), or similar 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 exterior walls (inside and outside faces), including joints at all exterior 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 weathertight 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 weathertight condition.

END OF SECTION

SECTION 08 11 13

STANDARD STEEL DOORS AND FRAMES

PART 1–GENERAL

1.01 SUMMARY

A. Work included: Thermally-insulated steel doors and frames.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. ANSI/SD1-100–Standard Steel Doors and Frames.

1.03 SUBMITTALS

A. Submittals shall be in accordance with provisions of Section 01 33 00–Submittals.

B. In addition to shop drawings and product data, indicate type of primer paint to be used and verify compatibility with field paint system specified.

PART 2–PRODUCTS

2.01 THERMALLY-INSULATED DOORS

A. Thermally-insulated doors shall be hollow full flush, 1 3/4-inch-thick, 16 gauge steel sheet in accordance with ANSI/SD1-100 with polyurethane core rigid reinforcing full thickness.

B. Acceptable products include the following, or equal:
   1. Ceco Imperial.
   2. Curries 707 Series.

2.02 FABRICATION–DOORS

A. Doors shall be fully-sealed, continuously-welded construction with all surface welds, joints, and seams filled and ground smooth.

B. Tops and bottoms of doors shall be completely closed with 16 gauge channels. Outside edges of doors shall be flush without depressions. No inverted channels will be allowed.

C. Mortise, reinforce, drill, and tap doors to receive hardware. Reinforcement shall be welded within the stiles and rails. Reinforce top rails to accommodate closers on either side and reinforce bottom for kickplate.

D. Glass in exterior doors shall be 1 inch thick.

2.03 FRAMES

A. Steel door frames shall be made of 14 gauge, cold-rolled, prime-quality steel in accordance with ANSI/SD1-100.

2.04 FABRICATION–FRAMES

A. Fabricate frames as welded unit. Weld joints continuously through full throat width of frames, including rabbets, soffits, and stops; grind, fill, dress, and make smooth, flush, and invisible.

B. Welded frames shall be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and shall not be used to size the frame opening.

C. Frames shall be 2 inches by 5 3/4 inches.

D. Fabricate frames with hardware reinforcement plates welded in place.

E. Provide anchors appropriate to wall type.

F. Provide frames for all steel doors.

2.05 FINISH

A. Doors and frames shall receive one coat of rust-inhibitive, shop-applied primer paint. Primer paint must be compatible with field-paint system specified.

B. Frames shall be finish-painted as specified in Section 09 91 00–Painting prior to installation. This includes back sides of door frames.

PART 3–EXECUTION

3.01 INSTALLATION–FRAMES

A. Install frames in accordance with ANSI/SD1-100.

B. Coordinate installation of frames with wall construction for anchor placement.

C. Coordinate installation of frames with installation of doors, hardware, joint sealers, and field painting.

D. Set all frames as supplied by manufacturer.

3.02 INSTALLATION–DOORS

A. Install doors in accordance with ANSI/SD1-100.

B. Coordinate installation of doors with installation of frames, hardware, glass and glazing, and field painting.

C. Set all doors as supplied by manufacturer. Hang all doors allowing for expansion and contraction at time of setting.

D. Set all hardware in accordance with templates as supplied by hardware supplier.

E. Cover all exposed hardware until completion of painting and finishing.

F. Examine hardware at completion; test, oil, grease, and adjust for perfect operation.

END OF SECTION

SECTION 08 33 23

OVERHEAD COILING DOORS

PART 1–GENERAL

1.01 SUMMARY

A. Work includes insulated overhead coiling door with manual operation, operating hardware, and supports.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. ASTM A653–Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

PART 2–PRODUCTS

2.01 MANUFACTURERS

A. Acceptable manufacturers include the following, or equal: Overhead Door Co. Series 625 Insulated Stormtite door, Raynor Series IF, or equal.

2.02 MATERIALS

A. Curtain:
1. Curtain slats shall be Type F-265l flat crown, pitch 2 5/8 inches, 0.040-inch aluminum. Back cover shall be 0.024-inch aluminum.
2. Slat system shall be integral and foamed in place with polyurethane foam nominal 2-pound density applied between the slat and back cover, rising to bond the slat and back cover into an integral member with a thickness of 3/4 inches.
3. End locks shall be used on alternate slats. Provide wind locks as required for 25 psf design wind load.

B. Bottom Bar: The bottom bar shall be two aluminum angles, minimum thickness 1/8 inch, bolted back-to-back to reinforce the curtain in the guides, and have a loop-type weather seal.

C. Guides:
1. Guides shall be three structural aluminum angles with a minimum thickness of 3/16 inches.
2. Guides shall be equipped with full door height PVC weather seals contacting the exterior and interior curtain surfaces to minimize air flow.
3. Guides shall be insulated full height and shall be equipped with wind lock bars to meet 25 psf design wind load.

D. Brackets:
   1. Brackets shall be minimum 3/16-inch-thick aluminum plate to support the barrel, counterbalance, and hood.
   2. Provide intermediate support brackets as necessary.

E. Counterbalance:
   1. Counterbalance shall be helical torsion springs housed in a steel pipe barrel, supporting the curtain with a deflection limited to 0.03 inches per foot of width.
   2. Counterbalance shall be adjustable by means of an external adjusting tension wheel and designed for minimum 20,000 cycles.

F. Hood:
   1. The hood shall be aluminum.
   2. The hood shall have an internal baffle and an external lintel baffle to retard air infiltration.

G. Locking: Manual chain hoist-operated doors shall have chain-keeper locks suitable for padlocking.

H. Manual Operator: Chain hoist.

2.03 FINISHES

A. The curtain and hood shall receive a clear anodized finish.

PART 3–EXECUTION

3.01 INSTALLATION

A. Door shall be installed in accordance with manufacturer's instructions and standards by an authorized representative.

B. Upon completion of installation, operating devices and controls shall be adjusted and lubricated to operate properly.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Hardware to fully equip all doors.
   2. Thresholds and weatherstripping.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REGULATORY REQUIREMENTS

A. Hardware shall comply with barrier-free requirements.

PART 2–PRODUCTS

2.01 EXIT DEVICES

A. Exit devices shall be Sargent 8813 x ETL Series, or equal, and shall be equipped with reinforced cross bars and functions as indicated on the hardware sets. The exit device shall be operated by a lockable lever from the exterior side.

2.02 HINGES

A. Butt hinges shall be Stanley FBB 191, Hager BB 1191, or equal, full mortise, ball bearing, nonferrous, nonrising, loose pin, and flat bottom tip, unless otherwise specified. Provide three 4 1/2-inch by 4 1/2-inch hinges per door for doors 7 feet or less in height with one additional hinge for each additional 30 inches or fraction thereof, unless otherwise specified. Provide additional hinges or heavyweight hinges for all doors that are over 36 inches wide, unless specified otherwise.

2.03 DOOR CLOSERS

A. Door closers shall be LCN Series 1460 for exterior doors, or equal. Provide aluminum finish on closers. Provide full covers. Door closers for locations noted as (ss) shall have the SRI primer for corrosion resistance. Door closers specified in paragraph 3.02 are LCN. (H-Hold Open).

2.04 KICKPLATES

A. Kickplates shall be Rockwood, or equal, 6 inches high. Kickplate width shall be 2 inches less than door width.

2.05 THRESHOLD AND WEATHERSTRIPPING

A. All exterior doors shall be weatherstripped with Reese DS75, National Guard Products, Inc. 156, or equal, weatherstripping. Provide Reese 323C, Pemko 315AN, or equal, sweeps; and Reese S425A, Pemko 171A, or equal, thresholds.

2.06 KEYING

A. Door keys shall be keyed to match existing locksets on site. Provide two keys per lock.

2.07 FINISH

A. Finish for all hardware, except as noted below, shall be US 26D or US 32D where stainless steel (ss) hardware is specified in paragraph 2.

B. Finish for surface bolts shall be US 26D; finish for kickplates shall be 32D.

C. Where stainless steel (ss) is specified, all hardware, including threshold and weatherstripping, shall be installed with stainless steel fasteners.

PART 3–EXECUTION

3.01 INSTALLATION

A. Provide finish hardware to fully equip all doors.

B. Install hardware in accordance with manufacturer's instructions.

3.02 SCHEDULE

A. Provide the following hardware groups in the amounts indicated on the door schedule or required for a complete and proper installation:

Group 1

Exit Device–8813 x ETL (ss)
Door Closer–1460 H(ss)
(Parallel Arm)
Hinges and Kickplate (ss)

END OF SECTION

SECTION 08 81 00

GLAZING

PART 1–GENERAL

1.01 SUMMARY

A. Work includes glass and glazing for door lights.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. GANA–Glass Association of North America.

1.03 WARRANTY

A. Exterior insulating glass shall be provided with a 10-year warranty against failure of the seal.

B. Coated glass shall be provided with a 10-year warranty against peeling, cracking, or deterioration of the coating.

PART 2–PRODUCTS

2.01 EXTERIOR GLASS

A. Glass in exterior door lights shall be 1-inch-thick insulating glass consisting of two pieces of 1/4-inch float glass separated by a 1/2-inch air space.

B. Acceptable manufacturers include the following, or equal: Oldcastle Glass Company, PPG Solarban 70XL.

C. Glass shall be Low-E with clear outboard light and clear tint inboard light with the following maximum values, or equal.

		U-Value		
	Shading Coefficient	Winter	Summer	SHGC
Clear	.32	.28	.26	.27

D. Exterior door lights shall have tempered glass in compliance with the governing building code.

2.02 GLAZING COMPOUNDS AND ACCESSORIES

A. Glazing system shall consist of a polyisobutylene-butyl tape, liquid polymer sealant, and vinyl roll-in strip.

B. Acceptable products include the following, or equal:
   1. Tremco Vision Strip System.
   2. General Electric Silglaze.

2.03 FABRICATION

A. Glazing of windows shall be from the interior.

B. Accessories such as setting blocks, clips, etc., shall be provided to properly set glass.

C. Obtain sizes from work at the site or from the manufacturer of work into which the materials will be set. Responsibility for the correctness of measurements shall be assumed by CONTRACTOR.

PART 3–EXECUTION

3.01 INSTALLATION

A. Comply with "Glazing Manual" by Glass Association of North America (GANA), except as specifically recommended otherwise by manufacturers of the glass and glazing materials.

B. Completed installation shall be water- and airtight.

END OF SECTION

SECTION 09 91 00

PAINTING

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Surface preparation and application of paints and coatings.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. ASTM B117–Standard Practice for Operating Salt Spray (Fog) Apparatus.

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

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

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

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

F. ASTM D4585–Standard 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. ICRI–International Concrete Repair Institute.

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

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

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

1.03 SUBMITTALS

A. Submittals shall be in accordance with provisions of Section 01 33 00–Submittals.

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.

B. Prepainting Meeting:
1. A prepainting meeting shall be held immediately following the project preconstruction conference. The prepainting meeting is to be held prior to any material and equipment that requires painting is delivered to the site.
2. CONTRACTOR, the paint subcontractor, and the paint manufacturer's representative shall be present to review the specifications and project scope.
3. The paint manufacturer's representative shall review progress at the site as requested by ENGINEER. These are generally expected to be prior to monthly progress meetings.

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 heat shall be indirect-fired hot air furnaces or electric heat. 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. Provide color charts for all coatings being used on the project. After initial selection of colors by OWNER, provide draw down samples of selected colors for OWNER's final approval. For stained wood, provide specified wood species sample with selected color for final approval.

B. CONTRACTOR shall provide a summary sheet at the completion of the project listing the finish paint products used and the manufacturer's color identification for each item painted. This summary sheet should be submitted to ENGINEER and OWNER for review.

PART 2–PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. All materials required for painting shall be types and quality as manufactured by Tnemec Company, Inc., Sherwin Williams Company, International Devoe, Carboline, PPG Protective and Marine Coatings, or equal, unless noted otherwise in the schedule.

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. International Devoe, Carboline, and PPG Protective and Marine Coatings have preapproved equivalent products that shall be used. Other manufacturer's products will be considered as a substitution if CONTRACTOR and paint manufacturer certify that the products offered are recommended for the service intended, are compatible with the shop primers used, are equal in solids content and composition, and are of the same type. Submittal shall include the following performance data as certified by a qualified testing laboratory. ASTM Specifications shall be the latest revision:
   1. Abrasion–ASTM D4060, CS-17 Wheel, 1,000 grams load.
   2. Adhesion–ASTM D4541.
   3. Hardness–ASTM D3363.
   4. Humidity–ASTM D2247 and D4585.
   5. Salt (Fog) Spray–ASTM B117.

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. Coal slag abrasive shall be used on pipe and ferrous materials. Staurolite abrasive shall be used on concrete and concrete block.
   5. Quality of surface preparations listed below are considered a minimum. 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, if necessary, 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.
   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 nonimmersion 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. Ductile iron pipe shall be prepared by abrasive blasting per National Association of Pipe Fabricators NAPF 500-03-04 Abrasive Blast Cleaning.
   6. Prior to finish coating, all primed areas that are damaged shall be cleaned and spot-primed.

C. Concrete:
   1. All concrete surfaces, including precast concrete to be painted, shall be cleaned of all form oil, curing compound, and other foreign matter. Concrete floors containing oil and grease residues shall be cleaned with detergent to remove all residues.
   2. All new concrete walls shall be abrasive-blast cleaned in accordance with SSPC-SP13/NACE No. 6 in order to prepare the surfaces for adherence of the painting systems as specified. Abrasive blasting of concrete shall result in a surface profile in accordance with ICRI No. 03732 at CSP-3 to CSP-5.
   3. Bug holes, pits, voids, and cracks shall be filled as specified in Section 03 30 00–Cast-in-Place Concrete without placing a friable sand-cement surface overall. The dried surface shall be stoned down.
   4. Paint manufacturer shall observe and approve the surface preparation method and the prepared surface prior to painting.
   5. 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. Galvanized: Where galvanized items are not submerged or buried, they shall be cleaned with nonhydrocarbon solvent cleaner (such as Clean N Etch, or equal) in accordance with SSPC-SP1 and shall be abrasive-blasted in accordance with SSPC-SP16 Brush-Off Blast Cleaning.

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. 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.

H. No paint shall be applied to new or existing surfaces until joints have been caulked according to Section 07 90 00 requirements, except at moving joints which shall be finish-painted before caulking or caulking shall be protected during painting.

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 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 containment walls:
   a. One filler coat (1/16-inch minimum thickness) Mortarclad 218, Duraplate 2300.
   b. Two coats of Series 66HS Hi-Build Epoxoline, Macropoxy 646.
3. Cast or ductile iron; not submerged or buried:
   a. One shop coat of 66HS-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 66HS Hi-Build Epoxoline II, Macropoxy 646 for interior surfaces, or
      (2) One coat of 66HS Hi-Build Epoxoline II, Macropoxy 646, and one coat of 1074 Endura-Shield, Acrolon 218HS for exterior surfaces.
4. Cast or ductile iron, tar coated; buried: Not painted.
5. Cast or ductile iron, submerged:
   a. One shop coat Series 1 Omnithane (20HS or 66HS-1255 Epoxoline), Dura-Plate 235 Beige as primer.
   b. Touch-up prime coat prior to finish coating and one stripe coat on all edges of 66HS Epoxoline, Dura-Plate 235.
   c. Two coats of Series 66HS-Hi-Build Epoxoline II, (one coat) Sher-Glass FF.
6. Steel, machinery, and equipment; not submerged:
   a. One shop coat of 66HS-1255 Hi-Build Epoxoline, Macropoxy 646 Beige as primer.
   b. Touch-up primer prior to finish coat, and either:
      (1) Two coats of 66HS Hi-Build Epoxoline II, Macropoxy 646 for interior surfaces; or
      (2) One coat of 66HS Hi-Build Epoxoline II, Macropoxy 646; and one coat of 1074 Endura-Shield, Acrolon 218HS for exterior surfaces.

      FIRST FIELD COAT SHALL BE APPLIED PRIOR TO INSTALLATION TO SURFACES INACCESSIBLE AFTER INSTALLATION INCLUDING BACK SIDES OF DOOR FRAMES. SEE DIVISION 08 FOR FACTORY-APPLIED DOOR PRIMERS.

7. 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 66HS Hi-Build Epoxoline II, Macropoxy 646 for interior surfaces, or
      (2) One coat of 66HS Hi-Build Epoxoline II, Macropoxy 646, and one coat of 1074 Endura-Shield, Acrolon 218HS for exterior surfaces.
8. Steel, machinery, and equipment, submerged:
   a. One shop coat Series 1 Omnithane (20HS or 66HS-1255 Epoxoline), Dura-Plate 235 Beige as primer.
   b. Touch-up prime coat prior to finish coating, and one stripe coat on all edges of 66HS Hi-Build Epoxoline, Dura-Plate 235.
   c. Two coats of 66HS H-Build Epoxoline, (one coat) Sher-Glass FF.
9. Galvanized Steel (Fire Protection Pipe): Two coats of 66HS Hi-build Epoxoline II, Macropoxy 646.
10. 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.

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		
66HS 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
1074 Endura-Shield II, Acrolon 218HS	---	2.5
66HS Hi-Build Epoxoline, Macropoxy 646 (Masonry and Concrete)	250	
Series1 Omnithane, DuraPlate 235 (Primer)		3.0, 5.0
N69 HI-Build Epoxoline (Submerged)		6.0
Sher-Glass FF (Submerged)		12.0

** 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: Colors are to be selected by OWNER.

END OF SECTION

SECTION 13 13 10

POLE BUILDINGS

PART 1–GENERAL

1.01 SUMMARY

A. Work included:
   1. Providing and installing a pre-engineered pole building. CONTRACTOR shall design all portions of the building.
   2. Framing and other building components are specified in other sections of the specifications. CONTRACTOR shall provide all necessary components for a complete, weathertight installation.

B. The intent of these specifications and drawings is to establish a quality and performance level for structural design, material, durability, and workmanship.

C. The building shall be the design of a manufacturer who is regularly engaged in the fabrication of pre-engineered structures. All materials shall be new, unused, and free from defects.

1.02 REFERENCES

A. *Cold Formed Steel Design Manual*–American Iron and Steel Institute.

B. ASTM A792/A792M–Steel Sheet, Aluminum–Zinc Alloy Coated by the Hot-Dip Process.

C. NFPA–National Design Specifications for Wood Construction.

D. The following criteria shall also be applicable in other phases of design:
   1. International Building Code 2012.
   2. ASTM Standards.

1.03 BUILDING DESCRIPTION

A. The building has a 18 feet 0-inch truss bearing height.

B. The main roof slope shall be 3 inches in 12.

C. The drawings show a surface mounted pole foundation. Lateral loads perpendicular and parallel to the ridge shall be carried through frame action with knee bracing, as necessary.

D. CONTRACTOR shall design and provide any necessary expansion joints.

1.04 DESIGN LOADS

A. The basic design loads shall include live and wind, in addition to dead load. All other design loads, whether they be of static, dynamic or kinetic nature, shall be considered as auxiliary loads.

B. Vertical Live Loads:
   1. Purlins shall be designed for snow loads and minimum live loads in accordance with the International Building Code 2012 uniformly distributed over the roof area which they support.
   2. Primary frames shall be designed for snow loads and minimum live loads in accordance with the International Building Code 2012 uniformly distributed over the roof area which they support and for concentrated loads shown on the drawings.
   3. All of the above loads to be in addition to the applicable dead loads and shall be applied to the horizontal projection of the roof.

C. Wind and Seismic Loads: All wind and seismic loads on the structure shall be determined and applied as horizontal and uplift forces in accordance with the International Building Code 2012.

D. Auxiliary Loads: Other superimposed static loads due to equipment shall be considered as part of the design requirements and combined with the normal design loads.

E. Combination of Loads: The combining of loads for design purposes shall be in accordance with the International Building Code 2012.

F. Minimum pole connections to existing concrete foundations to be calculated by the building designer.

G. Certification: After the awarding of the Contract, complete structural analysis shall be submitted by the building manufacturer to ENGINEER.

H. Structural Design:
   1. Perform calculations using diaphragm design analysis. Incorporate bracing as required if building exceeds diaphragm requirements.
   2. Comply with AF&PA *National Design Specification for Wood Construction (NDS).*
   3. Trusses:
      a. Limit deflection for live or snow loads to L/240.
      b. Comply with appropriate NDS and Truss Plate Institute (TPI) standards.
   4. Metal Roof and Wall Panels:
      a. Design in accordance with AISI *Specifications for the Design of Light gauge, Cold-Formed Steel Structural Members* and in accordance with sound engineering methods and practices.
      b. Design to support a 200-pound (90 kg) load evenly distributed over a 2-foot (60 mm) square area centered between purlins; limit deflection to L/180 in a two-span condition.
   5. Expansion/Contraction Provisions: Design clip attachment system to allow for expansion and contraction of metal roofing because of seasonal temperature variations without detrimental effect to the roof panels.

1.05 SUBMITTALS

A. Submittals shall be in accordance with provisions of Division 01.

B. Product Data: Provide data on profiles, component dimensions, wood-grade and treatment, fasteners, and wall and roof panels.

C. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections, attachments, openings, and loads; wall and roof system dimensions, panel

layout, general construction details, anchorages and method of anchorage, provide licensed/registered professional seal and signature.

D. Provide structural calculations stamped by an engineer licensed in the State of Kentucky.

1.06 WARRANTIES

A. Treated wood columns shall be warrantied against decay for 50 years.

B. Siding shall be warranted against fading of more than 6 MBS units over a 10-year period, chalking in excess of a numerical rating of 6 over a 10-year period, and checking, cracking, and peeling for a period of 20 years.

C. Roofing shall be warranted watertight for a period of 10 years.

PART 2–PRODUCTS

2.01 ACCEPTABLE MANUFACTURES

A. The products of the following manufacturers, or equal, are acceptable, provided that they comply with the remainder of this specification:
   1. Lester Buildings.
   2. Wick Buildings.
   3. Morton Buildings.

B. These products are set up as a standard of quality. Other manufacturer's products will be accepted if they are equal in quality.

2.02 MATERIALS

A. Treated Columns: The structural columns shall be a nailed laminated-column consisting of No. 1 Southern Pine Lamina. Each lamination shall extend from footing to eave without splice. All laminations shall be pressure-treated prior to assembly in accordance with the AWPA Standard to a net retention of 0.60 pounds per cubic foot with chromated copper arsenate. Lamination shall be of adequate size and number to resist design loads.

B. Wall and Roof Covering and Supports:
   1. Wall and Roof Panels:
      a. Exterior wall and roof panels shall be minimum 28 gauge, A250 Galvalume, 80 ksi steel with 7/8-inch major rib depth.
      b. The covering width and configuration of the panel shall be the building manufacturer's standard, provided all design criteria, including deflection, is met or exceeded.
      c. Panels shall be prepainted with silicone polyester, Colorweld SP, or equal, paint system. Color shall be selected by OWNER from manufacturer's standard colors.
      d. Fasteners shall have neoprene gasket washers and heads finished to match panels.
   2. Girts and Purlins:
      a. The girt's and purlin's configuration and thickness shall be the building manufacturer's standard, provided all design criteria, including deflection and girt spacing, is met.

b. Based on a simple span, the deflection of the girts (supporting the wall covering) shall not exceed L/180 and purlin deflection shall not exceed L/240 when supporting the applicable design load previously described.
c. Provide blocking and support at all openings.

C. Ceiling and Wall Liner Panel:
1. Provide metal liner panel on ceiling and walls as noted on drawings.
2. Liner panel shall be minimum 30 gauge G40 galvanized steel panels with finish that is suitable for interior use. Color shall be white.
3. Provide minimum of 2 by 4 joists at 48 inches on center to support ceiling.
4. Screw panels to joists recommended fasteners.
5. See Section 06 82 00 for FRP Wall Panel System where noted on drawings.

D. Batt Insulation: Provide 6 inches (walls) and 12 inches (ceiling) of batt insulation with vapor barrier. Vapor barrier 6 mil ASTM D4397, Class B polyethylene sheeting. Batt insulation shall conform ASTM C665, Type 1 by Certainteed, or equal.

E. Rigid Insulation: Provide 2-inch thick polyisocyanurate board insulation with foil facing on both sides. Insulation shall be DOW Thermax by DOW Corporation, or equal.

F. Accessories:
1. Soffit and Fascia: Provide manufacturer's standard vented steel soffits and fascia finished to match exterior panels.
2. Gutters and Downspouts: Provide manufacturer's standard steel gutters and downspouts finished to match exterior panels. Provide precast concrete splash pads at each downspout.
3. Provide manufacturer's standard snow guards on roof as shown.
4. Other Accessories: Doors, HVAC, and electrical equipment, etc., are specified elsewhere in these specifications.

PART 3–EXECUTION

3.01 EXAMINATION

A. Verify that site conditions are acceptable for erection/installation of preengineered wood building system.

B. Coordinate with responsible entity to perform corrective work on unsatisfactory conditions.

C. Commencement of work by erector/installer is acceptance of site conditions.

3.02 ERECTION-STRUCTURAL FRAMING

A. Erect in accordance with manufacturer's instructions and approved shop drawings.

B. Provide temporary erection and wind load bracing to maintain structure plumb and in alignment until installation of permanent bracing and/or roofing and wall coverings are completed.

C. Do not field-cut or alter structural members without approval of manufacturer.

3.03 INSTALLATION

A. Metal Roofing:
   1. General: Install in accordance with manufacturer's instructions. Secure to structural framing aligned, level and plumb. Space fasteners as shown on erection drawings.
   2. Sidelap: Minimum one full corrugation. Install sealant in sealant groove.
   3. Endlap: 12 inches for slopes less than 4 in 12, 6 inches for slopes greater than 5 in 12. Secure together over and to structural members.
   4. Accessories: Install as shown on erection drawings.

B. Metal Siding:
   1. General: Install in accordance with manufacturer's instructions. Secure to structural framing aligned, level, and plumb. Space fasteners as shown on erection drawings.
   2. Sidelap: Minimum one full corrugation.
   3. Field-cut end-wall panels to match roof slope.
   4. Fasteners: Wall panel-to-structural connections shall be made with galvanized fasteners with head finish to match panels.
   5. Accessories: Install as shown on erection drawings.

C. Insulation: Follow manufacturer's instructions for the type(s) of insulation specified. Fill miscellaneous voids and cavity spaces to ensure continuously-insulated envelope.

D. Personnel Doors: Follow manufacturer's instructions.

E. Joint Sealant Materials:
   1. Preparation: Clean joints and surfaces to receive sealants of foreign materials.
   2. Apply sealant with caulking gun using sufficient pressure to completely fill joints and ensure full contact of sealant to joint sides.
   3. Tool surface smooth and uniform, free of ridges, sags, and air pockets.
   4. Clean sealant from adjacent surfaces.

F. Openings:
   1. All openings in metal wall panel for all trades shall be done by the erector. All openings with any dimension 6 inches or larger shall be framed to provide adequate support.
   2. All openings shall provide complete structure support and be sealed for weather-tightness.

3.04 CLEANING

A. Clean surfaces soiled by work as recommended by manufacturer.

B. Touchup abrasions and other defects on prepainted metal panel surfaces with same type of primer and paint as original finish.

C. Remove surplus material and debris from site.

END OF SECTION

SECTION 13 34 23.19

PREFABRICATED ALUMINUM DOME STRUCTURES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: This section includes providing and installing a complete aluminum dome cover over the existing 50 foot diameter concrete aerated sludge holding tank No. 3. Provide all labor, equipment, and materials necessary to design, erect, and install the cover.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. National Bureau of Standards.

B. U.S. Department of Commerce.

C. American Society of Testing and Materials (ASTM) Standards.

D. 2013 Kentucky Building Code.

E. American National Standards Institute (ANSI).

F. ASCE 7–Building Code Requirements for Minimum Design Loads in Buildings and Other Structures, A58.1.

1.03 SYSTEM DESCRIPTION

A. The dome cover shall be a clear span structure designed to be supported from the periphery tank wall. The dome shall be a fully triangulated, all-aluminum space truss complete with noncorrugated closure panels and integral horizontal thrust tension ring.

B. Dome covers and appurtenances shall be suitable for service and exposure to conditions encountered at a wastewater treatment facility. All components of the dome shall be of corrosion-resistant materials.

C. All accessories for a complete, self-supporting, watertight dome cover shall be provided, including access hatches and ventilation system.

D. The dome surface paneling shall be designed as a watertight system under all design load and temperature conditions. All raw edges of the aluminum panels shall be covered, sealed, and firmly clamped with panel batten bars in an interlocking manner to prevent slipping or disengagement under all load and temperature changes. Dissimilar materials which are not compatible shall be physically separated or insulated from each other by means of gaskets or insulating compounds. Full provision shall be made to allow for thermal expansion. The dome structure deadweight shall not exceed 3.5 pounds per square foot of surface.

1.04 QUALITY ASSURANCE

A. The dome fabricator/erector must have installed, and had in satisfactory service for a period of not less than 5 years, at least one clear span aluminum dome with a diameter equal to or larger than the unit(s) specified, and shall submit evidence of such with his bid proposal and/or prebid submittal.

1.05 DESIGN LOADING

A. The dome supplier shall be responsible for the design of the cover and for detailing all supports required. The dome frame and skin shall be designed in accordance with the *Specifications for Aluminum Structures* as published by the Aluminum Association and designed for full dead load plus the following live load conditions:
   1. Dome Frame Design Loads:
      a. Minimum Basic Live Loading:
         (1) Symmetrical Live Loading: 30 pounds per square foot over the total plan area.
         (2) Nonsymmetrical Live Loading: 30 pounds per square foot on one-half the dome plan area with zero live load on the other half of the dome.
      b. Snow Loading: A roof snow load of 17 pounds per square foot as defined in the 2013 Kentucky Building Code. Snow load not to be applied concurrently with live load in 1.a. above.
      c. Wind Loading: A wind speed of 120 mph shall be used with the velocity pressures and force distribution as specified by ASCE-7 for wind exposure C. Wind force distributions based on wind tunnel test data for domes may be used in lieu of ANSI curved roof factors.
      d. Seismic Loading: Dome shall be designed to resist seismic forces using a Seismic Design Category (SDC) of D in accordance with the 2013 Kentucky Building Code.
      e. Vacuum Loading: A vacuum load of 2.6 pounds per square foot shall be applied perpendicular to dome surface at all points.
      f. Temperature: All of the above loads shall be considered within a temperature range from a low of -20°F to a high temperature of 120°F.
      g. Combined Loads: The basic load combinations for the dome analysis shall be in accordance with ANSI.
   2. Panel Design Load:
      a. The aluminum panels shall be secured to the dome frame to withstand the following vertical loads within the specified allowable stresses.
      b. Concentrated load of 250 pounds on one square foot at any point on the panel.
      c. A distributed load equal to 60 pounds per square foot over the total panel in either direction.
      d. Panel design loads are not to be added to dome frame design loads.

B. A field test of a panel in the dome selected by ENGINEER shall be made by the dome supplier at no additional cost to OWNER if requested by ENGINEER. The panel shall sustain a design load equal to 1.5 times the concentrated load or distributed load (2.b or 2.c.) without permanent distortion.

1.06 SUBMITTALS

A. Submit shop drawings under provisions of Section 01 33 00–Submittal. These shop drawings shall show dimensions, material grade, material thicknesses, material size, material finishes, clear joint attachment details, and an erection procedure.

B. A complete set of design calculations or a certificate of design shall be submitted to ENGINEER. The design calculations shall be stamped with the seal of a Kentucky registered Professional Engineer. The certificate of design shall include verification that the dome is designed in accordance with the Kentucky Building Code, the design loads used, and the license number of the Kentucky registered professional engineer. The domes shall be fabricated and erected in accordance with the approved drawings, procedures, and calculations.

C. On completion of construction and acceptance of the dome and prior to the final payment, the dome supplier shall submit a statement signed by the officer of the dome supplier that all work has been completed in accordance with the approved drawings and design calculations.

1.07 WARRANTY

A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year in accordance with GC12.6.

PART 2–PRODUCTS

2.01 MANUFACTURERS

A. Dome shall be CST Covers, Ultraflote, or equal. Project design based on CST Covers.

2.02 MATERIALS

A. Materials shall be as follows:
   1. Triangular space frame struts: 6061-T6 aluminum.
   2. Space frame gussets: 6061-T6 aluminum, minimum thickness .312 inch.
   3. Triangular closure panels: .050-inch-thick minimum 3003-H16 aluminum sheet.
   4. Panel batten bars to secure the triangular closure panels, and periphery flashings to the frame struts shall be designed to lock same in place and shall be extruded aluminum 6063-T6 or 6061-T6.
   5. Tension ring: 6061-T6 aluminum. Tension ring location shall be coordinated with access hatch locations.
   6. Fasteners: 7075-T73 aluminum or Series 300 stainless steel. Self-tapping screws will not be allowed to tap into material less than .1875 inch thick.
   7. Sealant: Shall be silicone, Dow 790, GE 1200, or equal. Sealant shall conform to Federal Specifications, TT-S-00-1543A and TT-S-00230C, or equal. Sealant shall be appropriate for intended use and shall be resistant to ozone and ultraviolet light.
   8. Gaskets: Shall be neoprene conforming to ASTM C509, silicone, GE No. SE 44188, or equal. Gaskets shall be compatible with methane and hydrogen sulfide and resistant to ozone and ultraviolet light.
   9. Vents, ducts, rain deflector, and hatches shall be 6061-T6, 5052-H36, 5086-H34 or 3003 H16 aluminum. Provide stainless steel handles, hinges, hold opens, hasps, and locks and hatches.
   10. Triangular skylight panels: 1/4-inch-thick clear acrylic. Skylight square footage shall be ±4% of covered area with a minimum of six panels placed as indicated on the drawings.
   11. Dome Ventilation System: Dome manufacturer shall provide one aluminum gravity vent, 36-inch-diameter clear opening in the dome at location as shown on the drawings. Vents shall be constructed of heavy gauge aluminum and designed for intake or exhaust.

Vents shall be Greenheck Model GRS-36, or equal. Provide aluminum curbs for each vent. Provide a 4-inch-high aluminum curb frame and aluminum backup bars. Curb to be secured by bolting through cover and backup bar. All hardware shall be stainless steel. Provide bird screen at ventilator openings.

12. Fabric seal around perimeter of tank shall be Ventlon, or equal. Fabric seal shall be anchored with stainless steel fasteners.
13. Perimeter counter-flashing between dome and tank wall shall be 0.05-inch aluminum.
14. Support Bearings: Sliding surfaces shall be Teflon on stainless steel. Aluminum is not acceptable as a sliding surface.
15. Provide one hatch for tank access where shown on the drawings. Provide hatch cover that seats and seals to frame and opens freely to clear opening. Provide reinforcement of dome panels in area beneath hatches to safely support personnel. Hatch must be able to be locked using padlock provided by others. Provide rain deflectors at upslope side of hatches. Hatches shall have additional frame support anchored to dome frame. Hatches supported by aluminum skin shall not be accepted. Provide reinforced skin at access hatch with nonskid surface for foot traffic.
16. Provide one 36-inch by 36-inch ventilation opening with dog house and 36-inch by 36-inch dampered opening facing out from tank. Damper shall be manually-operated Greenheck VCD-20, or equal, with aluminum or stainless steel bird screen.
17. Provide sealed penetrations for existing 2-inch diameter telescoping valve and 4-inch diameter DIP.
18. Provide sealed penetration for radar level sensor.

2.03 ANCHOR BOLTS

A. Provide all anchor bolts required for equipment furnished. Anchor bolts shall be Type 316 stainless steel of ample strength for the intended service. Provide anchor bolts in accordance with Division 05.

PART 3–EXECUTION

3.01 GENERAL

A. Refer to requirements specified in Division 01 for field installation, testing, and quality assurance.

3.02 FABRICATION AND ERECTION

A. Cover supplier shall perform the work described herein with mechanics skilled and experienced in the fabrication and erection of aluminum structures. The dome shall be constructed plumb, level, and in proper alignment.

B. Field refabrication of structural components or panels will not be accepted. Forcing of the structure to make fit during construction is expressly forbidden and not acceptable. All sealants and gaskets shall be applied and installed in a manner suitable to that of architectural class work.

C. All sealant joints shall be tooled slightly concave after sealant is installed. Care shall be taken to keep sealant confined to the joint area. Any sealant outside of the joint area shall be removed so that the panels will be free from misplaced sealant. All gasket material shall be continuous in their joint; splices will not be allowed. The work shall be directed by a qualified supervisor who shall remain on the job site until completion.

END OF SECTION

SECTION 20 05 48

VIBRATION AND SEISMIC CONTROLS FOR FIRE SUPPRESSION AND HVAC SYSTEMS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Seismic requirements for single-rod hanger supports for conduit, pipe, and other similar systems.
   2. Seismic requirements for trapeze-type supports for cable tray, conduit, pipe, and other similar systems.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. Kentucky Building Code.

B. ASCE 7-05–Minimum Design Loads for Buildings and Other Structures.

C. Cooper B-Line SRS-92–Seismic Restraints: Multi-Directional Bracing for Electrical Conduit, Cable Tray, and Mechanical Piping Systems.

D. ANSI/NFPA 70–National Fire Protection Association (National Electrical Code).

E. NFPA 13–Installation of Sprinkler Systems.

F. NFPA 14–Standpipe and Hose Systems.

1.03 QUALITY ASSURANCE

A. General: CONTRACTOR shall provide pre-engineered seismic restraint systems to meet total design lateral force requirements for support and restraint of piping, conduit, cable trays, and other similar systems and equipment where required by the applicable building code.

B. Manufacturer:
   1. System Supports/Restraints: Firms regularly engaged in the manufacture of products of the types specified in this section, whose products have been in satisfactory use in similar service for not less than 5 years.
   2. Bolted framing channels and fittings shall have the manufacturer's name, part number, and material heat code identification number stamped in the part itself for identification. Material certification sheets and test reports must be made available by the manufacturer upon request.

C. Installer: Company experienced in performing the work of this Section.

D. System shall be designed under direct supervision of Professional Engineer experienced in design of this work in the State of Kentucky.

1.04 SUBMITTALS

A. Submit seismic force level (F_p) calculations from applicable building code. Submit preapproved restraint selections and installation details from Cooper B-Line's Seismic Restraints catalog (SRS-02), or ENGINEER-approved equal.

B. Restraint selection and installation details shall be preapproved by a Professional Licensed Engineer experienced in seismic restraint design.

C. Submit manufacturer's product data on strut channels including, but not limited to, types, materials, finishes, gauge thickness, and hole patterns. For each different strut cross-section, submit cross-sectional properties, including Section Modulus (S_x) and Moment of Inertia (I_x).

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver strut systems, pipe hangers, and components carefully to avoid breakage, denting, and scoring finishes. Do not install damaged equipment.

B. Store strut systems, pipe hangers, and components in original cartons and in clean dry space; protect from weather and construction traffic.

PART 2–PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with these specifications, strut systems, pipe hangers, and accessories to be installed shall be manufactured by Cooper B-Line, Inc., or engineer-approved equal.

2.02 SEISMIC BRACING COMPONENTS

A. Steel strut shall be 1 5/8 inches wide in varying heights and mig welded combinations as required to meet local capacities and designs indicated. A material heat code, part number, and manufacturer's name shall be stamped on all strut and fittings to maintain traceability to material test reports.
   1. Material for epoxy painted strut: ASTM A1011, SS, Grade 33.
   2. Material for pregalvanized strut: ASTM A653, SS, Gr. 33.
   3. Material for hot-dip galvanized strut: ASTM A1011, SS, Grade 33 and hot-dip galvanized after fabrication in accordance with ASTM A123.
   4. Material for fittings and accessories: ASTM A1018-10, Gr. 33, Structural Quality or ASTM A1011, SS. Gr.33.
   5. Fittings and accessories: Products shall be of the same manufacturer as strut and designed for use with that product.

2.03 CODE INFORMATION

A. This project is subject to the seismic bracing requirements of the 2013 Kentucky Building Code. The following criteria are applicable to this project:
   1. Seismic occupancy or category: IV.
   2. Site class: D.
   3. Design spectral response accelerations: $S_{DS} = 0.2$, $S_{D1} = 0.15$.
   4. Seismic design category: D.
   5. Seismic importance factor: 1.50 for sprinkler piping; 1.5 for all other systems.

2.04 SEISMIC BRACING AND SUPPORT OF SYSTEMS AND COMPONENTS

A. General:
   1. Seismic restraint designer shall coordinate all attachments with the structural engineer of record.
   2. Design analysis shall include calculated dead loads, static seismic loads, and capacity of materials utilized for the connection of the equipment or system to the structure.
   3. Analysis shall detail anchoring methods, bolt diameter, and embedment depth.
   4. All seismic restraint devices shall be designed to accept without failure the forces calculated per the applicable building code and as summarized in Section 3.01.

B. Friction from gravity loads shall not be considered resistance to seismic forces.

C. Fire protection systems shall meet the requirements of NFPA-13 and NFPA-14 for the building seismic requirements.

PART 3–EXECUTION

3.01 INSTALLATION

A. Seismic Restraint of Piping:
   1. All seismic restraint systems shall be installed in strict accordance with the manufacturer's seismic restraint guidelines manual and all certified submittal data.
   2. Transverse piping restraints shall be at 40-foot maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.
   3. Longitudinal restraints shall be at 80-foot maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.
   4. Transverse restraint for one pipe section may also act as a longitudinal restraint for a pipe section of the same size connected perpendicular to it if the restraint is installed within 24 inches of the elbow or tee, or combined stresses are within allowable limits at longer distances.
   5. Hold-down clamps must be used to attach pipe to all trapeze members before applying restraints.
   6. Branch lines may not be used to restrain main lines.
   7. Provide reinforced clevis bolts when required.
   8. Piping crossing building seismic or expansion joints, passing from building to building, or supported from different portions of the building shall be installed to allow differential support displacements without damaging the pipe, equipment connections, or support connections. Pipe offsets, loops, anchors, and guides shall be installed as required to provide specified motion capability and limit motion of adjacent piping.
   9. Do not brace a system to two independent structures such as ceiling and wall.

10. Provide appropriately sized openings in walls, floors, and ceilings for anticipated seismic movement. Provide fire seal systems in fire-rated walls.

B. Seismic Restraint of Electrical Services:
   1. All seismic restraint systems shall be installed in strict accordance with the manufacturer's seismic restraint guidelines manual and all certified submittal data.
   2. Installation of seismic restraints shall not cause any change in position of equipment or piping, resulting in stresses or misalignment.
   3. No rigid connections between equipment and the building structure shall be made that degrade the noise and vibration isolation system specified.
   4. Do not install any equipment, piping, duct, or conduit that makes rigid connections with the building, unless isolation is not specified.
   5. Prior to installation, bring to the Architect's/ENGINEER's attention any discrepancies between the specifications and the field conditions, or changes required because of specific equipment selection.
   6. Bracing may occur from flanges of structural beams, upper truss cords of bar joists, cast-in-place inserts, or wedge-type concrete anchors. Consult structural engineer of record.
   7. Overstressing of the building structure shall not occur from overhead support of equipment. Bracing attached to structural members may present additional stresses. CONTRACTOR shall submit loads to the structural engineer of record for approval in this event.
   8. Brace support rods when necessary to accept compressive loads. Welding of compressive braces to the vertical support rods is not acceptable.
   9. Provide reinforced clevis bolts where required.
   10. Seismic restraints shall be mechanically attached to the system. Looping restraints around the system is not acceptable.
   11. Do not brace a system to two independent structures such as a ceiling and wall.
   12. Provide appropriately sized openings in walls, floors, and ceilings for anticipated seismic movement. Provide fire seal systems in fire-rated walls.

END OF SECTION

SECTION 20 05 53

IDENTIFICATION FOR FIRE SUPPRESSION AND HVAC PIPING AND EQUIPMENT

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Perform all work required to furnish and install equipment identification with supplementary items necessary for proper installation as specified herein, or shown on the drawings. CONTRACTOR shall identify including, but not limited to, all equipment, and dampers.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging with labels clearly identifying product name and manufacturer until ready for installation.

B. Storage: Store materials in clean, dry area indoors until ready for installation.

C. Handling: Protect materials and finish from damage during handling and installation.

PART 2–PRODUCTS

2.01 MANUFACTURERS

A. Marking Systems, Inc.

B. Seton Name Plate Company.

C. W. H. Brady Company.

2.02 EQUIPMENT NAMEPLATES

A. Type "A" Nameplates:

Use: Fans.
Unit heaters, etc.
Size: Minimum 4-inch by 4-inch.
Material: 3-layer laminated Micarta.
Background Color: Black.
Character Color: White.
Character Size: 1 1/4 inches.

Engraving: Equipment label.
Mounting Location: Equipment–Top wireway.

B. Electrical Device Labels:

Use: Identify control stations, thermostats, etc.
Size: 3/8-inch by 2-inch.
Material: 3-layer laminated Micarta.
Background Color: Black.
Character Color: White.
Character Size: 1/8 inch.
Engraving: Control station number or equipment controlled.
Mounting Location: Device front at top.

PART 3–EXECUTION

3.01 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state, and local requirements and referenced standards and conform to code and ordinances of authorities having jurisdiction.

B. Degrease and clean surfaces to receive nameplates.

C. Install nameplates parallel to equipment lines.

D. Affix nameplates with stainless steel screws or sticky-back adhesive.

E. Prepare and install neatly typed directions in all panels, including existing panels, where work is done under this Contract.

END OF SECTION

SECTION 21 10 00

WATER-BASED FIRE SUPPRESSION SYSTEMS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: There is limited area fire sprinkler zone outlined on the Drawings. The zone connects to a sprinkler riser and begins with a backflow preventer, flow switch, and an inspectors test and drain valve.

B. Provide complete fire protection systems that are compatible with the fire alarm system in accordance with the Factory Mutual Research Approval Guide. The fire protection system shall include all necessary piping, valves, controls, fittings, and hardware.

C. Work under this section shall commence with a connection to the potable water service and all interior fire protection systems.

D. CONTRACTOR may install additional piping and fittings and valves not shown on the drawings for testing purposes or for the convenience of the installation. Where such materials are installed, they shall comply with the specifications and shall be sized to be compatible with the system design. Remove such installed materials when they interfere with the design conditions.

E. Information given herein and on drawings is as exact as could be secured but is not guaranteed. Do not scale drawings for exact dimensions. Where architectural features govern location of work, refer to architectural drawings. Check, verify, and coordinate work with drawings and specifications prepared for other trades. Include all modifications, relocations, or adjustments necessary to complete work or to avoid interference with other trades.

F. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 CODES AND STANDARDS

A. Comply with requirements of Kentucky Building Code, local fire chief or fire marshal, insurance underwriter, and applicable National Fire Protection Association (NFPA) Standards (latest editions):
   1. ASSE 1015–Double Check Backflow Prevention Devices and Double Check Fire Prevention Backflow Prevention Assemblies.
   2. NFPA 13–Installation of Sprinkler Systems.
   3. NFPA 25–Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.
   4. NFPA 72–National Fire Alarm and Signaling Code.
   5. NFPA 329–Handling Releases of Flammable and Combustible Liquids and Gases.
   6. Underwriters Laboratories Fire Protection Equipment Directory.
   7. Current Factory Mutual Approval Guide.
   8. Local and State Building, Mechanical and Fire Codes.

1.03 QUALITY ASSURANCE

A. All drawings and hydraulic calculations shall be signed and sealed by a registered architect, Professional Engineer, or fire protection systems designer or signed and dated by the contractor responsible for the design and installation of the system, in accordance with the Kentucky Administrative Code.

B. CONTRACTOR shall be licensed by the State of Kentucky for installation of sprinkler fire protection systems.

C. CONTRACTOR(s) shall submit prequalification evidence of at least five projects of comparable size and scope successfully completed with their Bid. Distortion or misrepresentation of qualification evidence may result in Contract cessation.

D. UL and FM Compliance: Unless otherwise indicated, all products shall be listed in the latest publication of Approval Guides for Underwriters Laboratory and Factory Mutual for the service intended. All system components shall be in conformance with applicable NFPA Standards.

E. Any installed material not meeting the specification requirements must be replaced with material that meets these specifications without additional cost to OWNER.

1.04 DESIGN CRITERIA

A. Available water supply data (preliminary) is as follows:

Location	Date	Time	Flow (gpm)	Static Pressure (psi)	Residual Pressure (psi)
Branch 17178J	2/14/2018	1:30PM	1,250	107	30

B. Water test data is preliminary for Bidding purposes. CONTRACTOR shall perform flow tests prior to preparation of design calculations. Test shall be representative of high water-use periods.

C. Design fire protection systems in accordance with codes, standards, and regulations noted above. Design sprinkler systems for the most hydraulically remote area based on the following:

Zone Description	Area (sf)	Sprinkler System Type	Area of Sprinkler Operation (sf)	Sprinkler Density (gpm/sf)	Occupancy Classification	Sprinkler Rating (°F)	Total Combined Inside/Outside Hose (gpm)
Chemical Building	600	WET	600	0.2	OH GROUP II	165	250

D. Maximum head spacing according to NFPA 13 for each occupancy hazard indicated.

E. Hydraulic Calculations: Sprinkler systems which shall be hydraulically designed must be designed a minimum of 10% or 10 psi, whichever is greater, below the available water curve.

F. Hose Streams: Add indicated hose streams to all sprinkler zone hydraulic calculations at the base of the riser.

G. Water velocity throughout the entire system shall not exceed 20 feet per second.

H. Where weld fittings or mechanical grooved fittings are used, use only long radius elbows.

I. Fire protection system components shall be rated for minimum operating pressure of 175 psig.

1.05 SUBMITTALS

A. Submittals shall be in accordance with provisions of Section 01 33 00–Submittals. The provisions outlined in this section shall expand and supplement the requirements specified in Division 01. Where additional or differing requirements are indicated, the more stringent provision applies.

B. Submittals shall be sent to and approved by the Authority Having Jurisdiction prior to submitting to ENGINEER. Include copy of approval letters in submittal to ENGINEER.

C. Submit fire protection system drawings at minimum scale of 1/8 inch equals 1 foot 0 inches for floor plans and 1/2 inch equals 1 foot 0 inch for details. Drawings shall include water supply locations and size, piping layout and size, sprinkler locations and type, piping and fire protection specialty locations and type, valve stem movement, hanger locations and type, lighting, ductwork, equipment locations and type, valve locations and type, occupancy classes, hydraulic reference points, design areas, hose locations, and discharge densities. Include incidental details not usually shown or specified but necessary for proper installation and operation. Submittal drawings shall be stamped by the designer.

D. Prepare floor plans, reflected ceiling plans, elevations, sections, and details to conclusively coordinate and integrate all fire protection installations. Indicate locations where space is limited and where sequencing and coordination of installations are of importance to other trades.

E. Submit hydraulic calculations for water supply and sprinkler systems. Include summary sheet and detailed work sheets. Describe characteristics of water supply and location of effective point used in calculations. Include graph illustration of water supply, hose demand, and sprinkler demand.

F. Furnish product submittals for all equipment and systems. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and/or number as indicated in the Contract Documents. Where more than one item appears on a manufacturer's catalog sheet, the item(s) to be used shall be indicated by a red marking or an arrow. Include wiring diagrams of electrically powered equipment.

G. Material submittals shall include all items listed in the product section and all additional items necessary to provide a complete installation.

1.06 OPERATION AND MAINTENANCE MANUALS

A. Assemble material in three-ring or post binders using an index at the front of each volume and tabs for each system or type of equipment. In addition to the Division 01 requirements, include the following information:
   1. Copies of all approved submittals along with approval letters.
   2. Manufacturer's wiring diagrams for electrically powered equipment.
   3. Records of tests performed to certify compliance with system requirements.
   4. Certificates of inspection by regulatory agencies.
   5. Parts lists for equipment and specialties.
   6. Manufacturer's installation, operation, and maintenance recommendations for equipment and specialties.
   7. Valve types and locations.
   8. Warranties.
   9. Additional information as required for records and maintenance of system.
   10. Lubrication instructions including list/frequency of lubrication.
   11. Two copies of NFPA 25 current for the year the system is installed.

1.07 RECORD DRAWINGS

A. Maintain at the site an up-to-date marked set of "record" drawings that shall be corrected and delivered to ENGINEER upon completion.

B. Upon completion of the Work and final acceptance by the local authority, CONTRACTOR shall submit record drawings to OWNER and ENGINEER under the provisions of Division 01.

1.08 TRAINING

A. Instruct OWNER's personnel in the proper operation, maintenance, and testing of systems and equipment provided as part of this project. Include not less than one hour of instruction using the Operation and Maintenance Manuals and Record Drawings during this instruction. Demonstrate testing, start-up, and shutdown procedures for all equipment. All training shall be during normal working hours. Videotape all instructions and provide OWNER with copy.

PART 2–PRODUCTS

2.01 FIRE PROTECTION PIPING

A. Piping Belowground: Ductile iron pressure pipe, mechanical joint, AWWA C111 Class 53, 150 psi working pressure, ANSI/AWWA C151/A21.51. Ductile iron fittings, ANSI/AWWA C111/A21.11. Include cement mortar lining, ANSI AWWA C104 A21.4.

B. Piping Aboveground:
   1. Steel Pipe: Black steel pipe welded and seamless, Type F, Grade A, ASTM A53; black welded and seamless steel pipe for fire protection use, Type F, ASTM A795; electric resistance welded steel pipe, Grade A, ASTM A135. Threaded light wall pipe and plastic pipe are not acceptable.
   2. Pipe Wall Thickness: Threaded pipe shall have a minimum wall thickness of Schedule 40. All other pipe shall have a minimum wall thickness of Schedule 10. Piping 2 inches and under shall be minimum Schedule 40 unless stated otherwise herein.

3. Fittings (2 inches and Under): Cast iron pipe flanges and flanged fittings, Class 125/250, ASTM A126/ANSI B16.4. Malleable iron threaded fittings, Class 150/300, ASTM A197/ANSI B16.3. Standard weight seamless carbon steel weld fittings, ASTM A234 grade, ANSI B16.9. Mechanical grooved fittings with EPDM gaskets, ASTM A536 ductile iron, ASTM A47 malleable iron, or ASTM A53 fabricated steel. Fittings on galvanized pipe systems shall be galvanized.
4. Welding Materials: Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials.
5. Finish: Hot-dipped zinc-coated (galvanized) finish on piping and fittings exposed to weather and piping exposed to corrosive environments where indicated in design criteria. Thread or cut groove hot-dipped zinc-coated pipe ends for fitting connections.

C. Unions and Flanges:
1. Unions, flanges, and gasket materials shall have a pressure rating of not less than 175 psig.
2. 2-Inch and Smaller Steel: ASTM A197/ANSI B16.3 malleable iron unions with brass seats. Use black malleable iron on black steel piping and galvanized malleable iron on galvanized steel piping.
3. 2 1/2-Inch and Larger Steel: ASTM A181 or A105, Class 150, Grade 1 hot forged steel flanges of threaded, welding neck, or slip-on pattern on black steel and threaded only on galvanized steel. ANSI B16.1 or ANSI B16.5, Class 150 cast iron threaded flanges. Use raised face flanges ANSI B16.5 for mating with other raised face flanges or equipment with flat ring or full-face gaskets. Use ANSI B16.1 flat face flanges with full-face gaskets for mating with other flat face flanges on equipment. Provide galvanized flanges on galvanized piping.
4. Rigid or zero flex-type couplings will be used when operating pressures may cause piping to move out of place or sway on hangers. Flexible couplings may be used where piping is properly braced or clamped into a grid position.

D. Mechanical Grooved Pipe Connections:
1. Mechanical grooved pipe couplings and fittings, as manufactured by Victaulic, Anvil, or equal, may be used with cut steel pipe. Couplings and fittings shall be malleable iron ASTM A47, or ductile iron A536 with painted finish. Fittings used on galvanized steel pipe shall have galvanized finish, ASTM A153.
2. All mechanical grooved pipe material including gaskets, couplings, fittings, and flange adapters shall be from the same manufacturer.
3. Gaskets shall be EPDM, ASTM D2000. Heat-treated carbon steel oval-neck track bolts and nuts, ASTM A183 with zinc electroplated finish. Gaskets for dry systems shall be flush seal or flush gap design.
4. "Pipeolets" or similar mechanically attached fittings will not be permitted as fittings. "Weldolets" welded to cross mains in fabrication shops will be permitted as a fitting to supply branch piping only, unless specifically approved for other applications.
5. Fittings and couplings must be suitable for the temperature and pressure involved. In no case is the final system to have a pressure rating of less than 175 psig.
6. Acceptable fittings and couplings are listed below, based on Victaulic figure numbers:
   a. Couplings: Standard flexible couplings, Style 77; or lightweight couplings, Style 75. Reducing couplings are not acceptable.
   b. Flanges: Flange adaptor, Style 741, except at lug-type butterfly valves where standard threaded flanges shall be used.

2.02 HANGERS, SUPPORTS AND ANCHORS

A. Comply with the requirements of applicable NFPA Standards. Hangers shall be UL-listed and FM-approved, unless otherwise specified.

B. Riser clamps shall not protrude more than 2 inches beyond the edge of the hole. The riser clamps need to be only UL listed, Grinnell figure 261, or approved equal.

C. Below concrete construction, inserts, expansion cases, or Phillips-type shells shall be installed to support piping smaller than 6 inches. Concrete expansion anchors are to be Hilti Drop-in Anchor, Phillips concrete fasteners, or approved equal. "Kwik" bolts or similar concrete anchors are not permitted. Below concrete construction inserts shall be installed for all piping 6 inches and larger. In lieu of inserts, expansion shields spaced no more than 10 feet apart may be installed in accordance with NFPA 13, Sections 2-6 and A-2-6.3.

D. Corrosive Atmosphere Coatings: Factory coat supports and anchors used in corrosive atmospheres with hot dip galvanizing after fabrication, ASTM A123, 1.5 ounces/square foot of surface each side. Mechanical galvanize threaded products, ASTM B695 Class 50, 2.0 mil coating. Field cuts and damaged finishes shall be field-covered with zinc rich paint of comparable thickness to factory coating. Provide paint on all galvanized piping within corrosive atmospheres per Specification 09 91 00.

E. Equipment Stands: Use structural steel members welded to and supported by pipe supports. Clean, prime, and coat with three coats rust inhibiting alkyd paint or one coat epoxy mastic. Where exposed to weather, treat with corrosive atmosphere coatings.

2.03 SPRINKLERS

A. Manufacturer: Sprinkler head model numbers establish type and style of head. Products of the following manufacturers, determined to be equal by ENGINEER, will be accepted: Central Sprinkler Corporation, Reliable Automatic Sprinkler Co., Star Sprinkler Corporation, Viking Corporation, Victaulic, and TYCO.

B. All sprinkler heads shall be UL listed and FM approved, fusible link or glass bulb type, cast brass or bronze construction. Provide heads with nominal 1/2-inch discharge orifice except where greater than normal density requires large orifice.

C. Select fusible link or glass bulb temperature rating to not exceed maximum ambient temperature rating allowed under normal conditions at installed location and as indicated. Provide ordinary temperature fusible link or glass bulb type except where adjacent to unit heaters, mechanical rooms, or where otherwise indicated.

D. Sprinkler heads shall be listed corrosion-resistant heads.

E. Sprinkler Cabinets: Provide cabinets complete with required number of spare heads of each type and temperature rating and special wrenches in accordance with NFPA 13. Provide multiple cabinets as required. Cabinet shall be finished steel suitable for wall mounting with hinged cover and adequate space for required spare heads and wrenches. Coordinate cabinet location with OWNER's representative. Coordinate quantities with the authority having jurisdiction over the project.

2.04 VALVES

A. Manufacturers: Kennedy, Milwaukee, Nibco, Stockham, Victaulic, Viking, and Watts.

B. Line Control Valves 2 Inches and Smaller:
   1. Ball Valves: Bronze 2-piece, threaded or sweat ends, standard port, blowout-proof stem, chrome-plated ball, glass-reinforced seats, UL approved, 250 psi rating.
   2. Butterfly Valve: Bronze body butterfly valve, 175 psig, geared operator, visible position indicator, normally open tamper switch with double wire leads, Buna or Viton seat, stainless steel disc and stem. Equal to Milwaukee Model BB-SC Series.

C. Line Control Valves 2 1/2 Inches and Larger:
   1. Gate Valve: UL listed/FM-approved, outside screw and yoke (OS&Y) gate valves, 175 psig, cast iron body, bronze-mounted, bolted bonnet, rising stem, solid wedge, with normally open tamper switch with double wire leads. Valves shall be capable of being repacked under pressure with valve wide open. Equal to Nibco F-607-OTS.
   2. Butterfly Valve: Cast or ductile iron body butterfly valve, lug style or grooved, 175 psig, geared operator, visible position indicator, normally open tamper switch with double wire leads, EPDM resilient seat, EPDM seals, nickel-plated ductile iron disc. Valve assembly to be bubble tight to 175 psig with no downstream flange/pipe attached. Use cap screws for removal of downstream piping while using the valve for system shutoff. Equal to Nibco LD3510-8.

D. Test and Drain Valves:
   1. Threaded bronze globe type with composition disc, 175 psi WOG. Valves shall be equal to Nibco KT-65 for piping assemblies built on site. Victaulic style 718 or 719 or equal may be installed to save space and assembly time.
   2. Drain Valves: UL listed, 3/4-inch minimum, two- or three-piece bronze body ball valve; threaded ends, chrome-plated bronze ball; glass-filled Teflon seat; Teflon packing and threaded packing nut; blowout-proof stem; 400 psig WOG. Low point drain valves shall have, in addition, a 1-inch brass nipple with 3/4-inch male hose threads and cap.
   3. Combination test, drain, and pressure relief valves:
      a. AGF Model 1011A TESTanDRAIN, or equal.
      b. Valve shall be UL listed and FM approved.
      c. 3/4-inch minimum size, bronze body and relief valve, Teflon seat, brass ball, stem, and bypass fittings, braided nylon bypass tubing.
      d. Orifice size shall be determined by sprinkler heads in system.
      e. Pressure relief valve shall be factory-rated for 175 psi.

E. Check Valves: Cast or ductile iron body, flanged or grooved ends, bolted cap, renewable bronze seat and disc, stainless steel clapper with a replaceable rubber seal (a rubber seal integral with the seat is not acceptable), and 175 psig suitable for installation in a horizontal or vertical line with flow upward. Valve equal to Viking Model D, Central Model 90. Provide 1/2-inch automatic drip drain on inlet to fire department connection check valve. Provide full-sized check valve bypass with shutoff valve and tamper switch to facilitate annual testing of backflow preventer.

2.05 BACKFLOW PREVENTER

A. Manufacturers: Ames, Conbraco, Febco, Watts, Beeco, Cla-Val, Wilkinson.

B. ASSE 1015 double check backflow preventer with two independent spring-loaded check valves, two isolation ball or gate valves with normally open tamper switches, double wire leads, 4-valved test ports, and lockable valves. Constructed of bronze or epoxy-coated cast iron or stainless steel body with bronze and plastic internal parts, stainless steel springs, silicone rubber valve discs, bronze seats, rated for 175 psig. Size for a pressure drop of 10 psig at 500 gpm.

2.06 SPECIALTY VALVES

A. Manufacturer: Central Sprinkler Corporation, Grinnell, Reliable, Star Sprinkler, Viking, and Victaulic.

2.07 ACCESSORIES

A. Fire Department Connection:
   1. Manufacturers: All equipment shall be UL listed and FM-approved by Elkhart Brass, Potter-Roemer, Badger-Powhatan, Croker Corp., J.W. Moon, and W.D. Allen.
   2. Fire Department Pumper Connection: Pumper connection shall be flush type, cast brass body with drop clappers, polished chrome cover plate with lettering reading "AUTO SPRINKLER." Unit shall include 4 by 2 1/2 by 2 1/2 chrome-plated brass snoots with rigid end threading to match local fire department standards by pin-lug hose thread swivels, pin-lug plugs, and chains. Pumper connection shall be Potter-Roemer series 5026-D, or equal.
   3. Ball Drip: Provide a bronze ball drip for the fire department connection inside of the building and pipe to the nearest floor drain.

B. Pressure Gauges:
   1. Manufacturer: Ametek/U.S. Gauge Division, Ashcroft, Marsh, Taylor, H.O. Trerice, Weiss, Weksler.
   2. Cast aluminum, stainless steel, or brass case of not less than 3.5 inches in diameter, double-strength glass window, black lettering on a white background, phosphor bronze bourdon tube with bronze bushings, recalibration from the front of the dial, 99% accuracy over the middle half of the scale, 98.5% accuracy over the remainder of the scale. Include bronze three-way globe valve with plugged outlet for fire inspector's test gauge.

PART 3–EXECUTION

3.01 GENERAL INSTALLATION

A. Install pipe, fittings, equipment, and components in accordance with referenced standards, manufacturer's recommendations, recognized industry practices, and the authority having jurisdiction.

B. General Coordination: Install all piping parallel to building walls and ceilings and at heights that do not obstruct any portion of a window, doorway, stairway, or passageway. Where interferences develop in the field, offset or reroute piping as required to clear such interferences. Coordinate locations of fire protection piping with piping, ductwork, conduit, and equipment of other trades to allow sufficient clearances. In all cases, consult drawings for exact location of pipe spaces, ceiling heights, ceiling grid layout, light fixtures, and grilles before installing piping.

C. Where piping must be embedded in masonry or concrete, provide protective sleeve covering of elastomeric pipe insulation.

D. Maintain piping, fittings, and fire protection system components in clean condition internally during construction. All material shall be kept at proper temperature to assure proper jointing. Pipe and fittings shall be corresponding materials when assembled.

E. Provide clearance for access to valve and piping specialties to facilitate maintenance and repair or replacement.

F. Pipe shall be hung from building members using concrete inserts or beam clamps. Provide anchors, expansion joints, swing joints and/or expansion loops so that piping may expand and contract without damage to itself, equipment, or building.

G. Install sprinkler piping so that the system can be drained in accordance with NFPA 13. Where possible, slope to main drain valve. Where piping not susceptible to freezing cannot be fully drained, install nipple and cap for drainage of less than 5 gallons or ball valve with hose thread outlet and cap for drainage over 5 gallons. Pipe main drain valve, inspector's tests, and auxiliary drains to grade or to air gap sewer receptor.

H. Provide 3/32 inches minimum thickness steel nailing plates behind or on either side of piping where the possibility of penetration from nails or drywall screws exists.

I. Mitered ells, notched tees, and orange peel reducers are not acceptable. Bushings and reducing couplings are not acceptable.

J. Install auxiliary drains at all low points in the system, air vents at all high points in the system, and as required by the referenced standards. Drains and vents shall consist of, as a minimum, a 1-inch ball valve, 1-inch brass nipple with 3/4-inch male hose threads and cap.

K. Fire Barrier Penetrations: Where pipes pass through fire-rated wall assemblies, partitions, ceilings, or floors, the fire rating integrity shall be maintained.

L. Do not install piping within exterior walls.

M. Do not route piping above transformers, panelboards, or switchboards including the required service space for this equipment, unless the piping is serving this equipment.

N. Floor and Roof Protection:
   1. CONTRACTOR shall take extra precautions to protect the floors and roofs from oil spillage and dripping. Any operation, such as cutting and threading of pipe that can result in dripping of oil and thread cuttings, shall be done over a drain pan that will collect all drippings. Tarpaulins, plywood, or drop cloths shall be used around such piping to prevent workers from tracking oil over the area. Workers shall be cautioned about cleaning their feet. Any liquids, such as oil, that will be used in this work shall be kept in tightly stoppered containers; extreme care shall be used when charging equipment with these materials to avoid any spills.
   2. All residual matter deposited on floors, roofs, walls, and other surfaces because of the system installation shall be completely removed.

3.02 WELDED PIPE JOINTS

A. Welded joints shall be made in a fabrication shop. No welding is allowed at the project site.

B. Make all welded joints by fusion welding in accordance with ASME Codes, ANSI B31, and the Kentucky Building Code where applicable. Electrodes shall be Lincoln, or approved equal, with coating and diameter as recommended by the manufacturer for the type and thickness of work being done.

C. "Weldolets" and "Threadolets" may be used for branch takeoffs up to one-half the diameter of the main.

3.03 THREADED PIPE JOINTS

A. Joints of threaded pipe shall be made by cutting pipe square and reaming inside. Ream ends of pipe to remove burrs. Clean scale and dirt from interior and exterior of each section of pipe and fitting prior to assembly. Threads shall be cut so that exposed threads shall not exceed three. Exposed threads shall be coated with asphaltum. Use joint compound sparingly.

B. Use a thread lubricant or Teflon tape when making joints; no hard setting pipe thread cement or caulking will be allowed.

3.04 MECHANICAL GROOVED PIPE CONNECTIONS

A. Use pipe factory-grooved in accordance with the coupling manufacturer's specifications or field-grooved pipe in accordance with the same specifications using specially designed tools available for the application. Lubricate pipe and coupling gasket, align pipe, and secure joint in accordance with the coupling manufacturer's specifications.

3.05 UNIONS AND FLANGES

A. Install a union, flange, or grooved coupling combination at each connection to each piece of equipment and at other items that may require removal for maintenance, repair, or replacement. Where a valve is located at a piece of equipment, locate the flange or union or grooved coupling combination connections on the equipment side of the valve. Concealed unions, flanges, or couplings are not acceptable.

3.06 HANGERS

A. Support piping in accordance with NFPA 13, other sections of this specification, and in accordance with all state and local requirements.

B. Provide hangers to support all piping in perfect alignment without sagging or interference, to permit free expansion and contraction and to meet the requirements of NFPA 13. Strap hangers, wire hangers, or trapeze hangers will not be acceptable.

3.07 SPRINKLER HEADS

A. Install sprinkler heads as recommended by manufacturer. Locate sprinkler heads as indicated on fire protection plan and reflected ceiling plan maintaining minimum clearances from obstructions, ceilings, and walls. Install sprinkler heads level in locations not subject to

spray pattern interference. When ducts, lights, or other objects are obstructions to sprinkler distribution, additional heads shall be provided beneath the obstruction.

B. All sprinkler heads installed in finished ceilings shall be fed by a swing joint or return bend arrangement for final positioning in ceiling grid pattern during construction phases.

C. All sprinkler heads shall be centered on ceiling tile.

3.08 GAUGES

A. Provide a valved pressure gauge in main fire protection riser, at or near each test connection, and at the top of each piping riser. Provide gauge with a connection having a soft metal seated globe valve arranged for draining pipe between gauge and valve. Install gauges to permit removal and where they will not be subject to freezing.

3.09 VALVES

A. Properly align piping before installation of valves. Do not support weight of piping system on valve ends. Mount valves in locations that allow access for operation, servicing, and replacement. Install all valves with the stem in the upright or horizontal position. Valves installed with the stems down will not be accepted. Provide a riser shutoff valve and a capped hose thread drain valve at the bottom of each riser. Provide capped hose thread drain valves to allow draining of each portion of piping.

B. Provide permanently marked identification signs indicating the portion of the system controlled by each valve.

C. Install locking device with each shutoff valve to prevent inadvertent closing of the valve. Keys shall be indexed to identify valve location.

3.10 SPECIALTY VALVES

A. Install fire protection riser in vertical position. Install trim recommended by manufacturer including drain and test valves. Route drains to hub or floor drains. Test and adjust operation of valves, alarms, pressure maintenance devices, and deluge/preaction controls.

3.11 FIRE DEPARTMENT CONNECTIONS

A. Fire department connections will be installed in the same location as the double check valve assembly. Mount on wall where indicated and/or as required. Support from structure independent of piping. Locate between 2 feet to 3 feet above grade. Fill wall penetration with insulation and caulk exterior and interior face of wall opening weathertight.

B. Provide 1/2-inch automatic drip drain on inlet of fire department connection check valve and where indicated.

3.12 TEST CONNECTIONS

A. Install test connections sized and located in accordance with NFPA Standards, complete with shutoff valve. Test connections may also serve as drain pipes.

B. Provide test connections for each flow switch. Test connections shall discharge to appropriate receptacles.

C. When test valves are located remote from the flow switch, the valve shall be identified with a brass tag denoting which flow switch is being tested.

3.13 FINISHES

A. See Section 09 91 00 for methods and material required for work under this section.

3.14 TESTING

A. Flush, test, and inspect sprinkler piping systems in accordance with NFPA 13.

B. The sprinkler system shall be tested as an entire system or partial system. The system shall be hydrostatically tested at 200 psi for 2 hours. No leakage allowed. All defective joints shall be replaced with new materials. No caulking of defective joints shall be allowed. After defective joints are replaced, the system shall be retested until satisfactory results are obtained. Pipe shall not be concealed until satisfactorily pressure-tested.

C. ENGINEER and OWNER shall be notified 24 hours prior to any pressure test. This test shall be performed in the presence of appropriate representatives for OWNER and ENGINEER. A log of tests shall be kept stating who performed test, time and date of test, what section of system was tested, and results of test with properly executed Contractor's Material and Test Certification forms from NFPA 13, Chapter 8. This log shall be kept at the job site and submitted to ENGINEER for review.

3.15 IDENTIFICATION

A. Identify equipment with engraved nameplates.

B. Identify interior piping mains not less than once every 25 feet, not less than once in each room, adjacent to each access door or panel, and on both sides of the partition where exposed piping passes through walls or floors. Place flow directional arrows at each identification location. Provide one piece, preformed construction, snap-around pipe markers fastened by nylon ties at each end of the marker.

C. Identify valves with signs according to NFPA rulings.

D. Provide a hydraulic design information sign of permanently marked weatherproof metal or engraved nameplate material. Secure to alarm valve with brass chain or nylon wire ties. Information shall include location of the design areas. Include discharge densities, required flow and residual pressure at base of the riser, hose stream demand and fire sprinkler head demand.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Balancing air systems.
   2. Balancing water systems.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. ASHRAE 11–Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air Conditioning, and Refrigeration Systems.

B. SMACNA–HVAC Systems Testing, Adjusting, and Balancing.

1.03 SUBMITTALS

A. Submit under provisions of Section 01 33 00–Submittals.

B. Prior to final balancing, submit a preliminary report that includes the following design information for all control modes. Design information shall be from approved shop drawings. Report shall compare design and field tested data.
   1. For each supply, return and exhaust register, and ceiling outlet:
      a. Room number.
      b. Type of register and outlet and catalog size.
      c. Air flow factor.
      d. Design CFM and velocity.
      e. Actual CFM and velocity.
      f. Percent of design CFM.
      g. Room pressure relationship.
   2. For each fan and pump:
      a. Unit number.
      b. Fan size and wheel type.
      c. Motor horsepower.
      d. Motor nameplate voltage and amps.
      e. Design CFM and static pressure (total pressure).
      f. Actual CFM and static pressure (total pressure).
      g. Actual fan RPM.
      h. Actual motor voltage and amps (each phase).

C. Provide summary sheet describing mechanical system deficiencies. Where not physically observable, provide pressure and/or flow readings to demonstrate suspected deficiencies. Describe objectionable noise or drafts found during testing, adjusting, and balancing. All deficiencies shall be corrected prior to final balancing.

D. Upon completion of final balancing, provide updated report indicating changes to system during final balancing for all control modes including updated airflows, pressures, velocities, etc. Final report shall be submitted prior to substantial completion.

1.04 QUALITY ASSURANCE

A. Obtain services of an independent testing organization to perform testing and balancing work. The organization shall have a certified membership in the Associated Air Balance Council (AABC) or certification by the National Environmental Balancing Bureau (NEBB).

B. Division 23 shall provide a technician and/or controls contractor to observe and assist in balancing the system. Balancing report must include verification of participation, including name and contact information of assisting party.

PART 2–PRODUCTS

2.01 BALANCING EQUIPMENT

A. CONTRACTOR shall have the following minimum equipment for balancing systems:
1. Duct air velocities below 1,000 fpm: Pitot tube and Micro-Manometer or Alnor velometer and duct-jet using zero to 1,000 fpm range.
2. Water Flows: Ultrasonic Dopler Flow Meter for water systems.
3. Supply Register Velocities: Alnor velometer and applicable jet or Anemotherm.
4. Fan Rotative Speed: Timec tachometer or RPM counter and stop watch (1-minute reading, minimum).
5. Contact pyrometer 0 to 300°F range.
6. Amprobe model RS-3, or equal.
7. Calibrated pressure gauge (0 to 100 feet water head).
8. Inclined manometer 0 to 30 inches of water.
9. Instruments used for measurements shall be accurate, and calibration shall be calibrated by the manufacturer or an AABC-approved method.
10. Instruments shall be applied in accordance with manufacturer's instructions.

B. All instruments used for measurements shall be accurate, and calibration histories for each instrument to be available for examination upon request. Calibration and maintenance of all instruments to be in accordance with the requirements of NEBB or AABC Standards.

PART 3–EXECUTION

3.01 PRELIMINARY BALANCING

A. Division 23 shall provide an experienced installer to review the air distribution system with the testing and balancing agency for completion to confirm the test openings and volume dampers indicated on the drawings or called for in the specifications are installed, that dampers are in the open position, that the fans operate properly during all control modes, air filters are clean, and that the system is ready for balancing. Add test openings, volume dampers, air scoops, deflectrols, turning vanes, etc., as required. Adjust and change fan drives and belts, remove and reinstall ceilings, air terminals, access doors, and air devices as required to balance the system. Maintain the air handling equipment in good operating condition during the testing and balancing procedures.

3.02 SCHEDULE OF TOLERANCES

A. Final air system measurements shall be within the following range of specified cfm:
   1. Fans: 0% to +10%.
   2. Return/exhaust grilles, registers: 0% to -10%.

3.03 GENERAL REQUIREMENTS

A. Perform testing, balancing, and adjusting procedures in accordance with AABC or NEBB, unless specified below.

B. Contact Division 26 for assistance in operation and adjustment of controls during testing, adjusting, and balancing procedures. Cycle controls and verify proper operation and setpoints. Include in report description of temperature control operation for all control modes and any deficiencies found.

C. Permanently mark equipment settings, including damper and valve positions, control settings, and similar devices allowing settings to be restored. Set and lock memory stops.

D. Division 23 shall correct any installation deficiencies found by the test and balance agency that were specified and/or shown on the Contract Documents to be performed as part of that division of work, including sheave and pulley replacement or corrections to the controls system. Test and balance agency shall notify CONTRACTOR of these items and instructions will be issued to Division 23 for correction of the deficient work. Testing and balancing reports shall be submitted only after all deficiencies have been corrected and balancing completed upon the corrected system.

END OF SECTION

SECTION 23 07 13

DUCTWORK INSULATION FOR HEATING, AIR CONDITIONING, AND VENTILATION

PART 1–GENERAL

1.01 SUMMARY

A. Work includes:
1. Wrap type fiberglass insulation.
2. Rigid board fiberglass insulation.
3. Adhesives, mastic, sealants, and reinforcing materials.
4. Jacketing.
5. Accessories.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. All material, installation, and workmanship shall comply with the applicable requirements and standards addressed within the following references:
1. ASTM B117–Standard Practice for Operating Salt Spray (Fog) Apparatus.
2. ASTM C168–Standard Terminology Relating to Thermal Insulation.
3. ASTM C272–Water Absorption of Core Materials for Sandwich Constructions.
4. ASTM C547–Standard Specification for Mineral Fiber Pipe Insulation.
5. ASTM C518–Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
6. ASTM C591–Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
7. ASTM C612–Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
8. ASTM C916–Standard Specification for Adhesives for Duct Thermal Insulation.
9. ASTM C1071–Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).
10. ASTM C1290–Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts.
11. ASTM C1427–Standard Specification for Extruded Preformed Flexible Cellular Polyolefin Thermal Insulation in Sheet and Tubular Form.
12. ASTM D1000–Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications.
13. ASTM E84–Standard Test Method for Surface Burning Characteristics of Building Materials.
14. ASTM E96–Standard Test Methods for Water Vapor Transmission of Materials.
15. FED L-P-535E: Plastic Sheet (Sheeting): Plastic Strip: Poly (Vinyl Chloride) And Poly (Vinyl Chloride-Vinyl Acetate), Rigid.
16. EPA Method 8260B–Volatile Organic Compounds By Gas Chromatography/Mass Spectrometry (Gc/Ms).
17. NFPA 262–Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

1.03 SUBMITTALS

A. Submit under provisions of Section 01 33 00–Submittals.

B. Submit a schedule of all insulating materials shall be used on the project, including adhesives, fastening methods, and fitting materials, along with material safety data sheets and intended use of each material. Include manufacturer's technical data sheets indicating density, thermal characteristics, jacket type, and manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the drawings.

B. Equipment provider shall be responsible for providing certified equipment start-up and, when noted, an in the field certified training session. New start-up shall be for the purpose of determining alignment, lubrication, voltage, and amperage readings. All proper electrical connections, discharge and suction gauge readings. A copy of the start-up report shall be made and sent to both the CONTRACTOR and to the ENGINEER.

C. Compressor, dryer and all accessories shall be in accordance with the schedule on the drawings.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids and lifting lugs, if required for handling.

B. Materials that could be damaged by the elements should be packaged in such a manner that they could withstand short-term exposure to the elements during transportation.

C. Store materials in clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.

D. Use all means necessary to protect equipment before, during, and after installation.

E. All scratched, dented, and otherwise damaged units shall be repaired or replaced as directed by OWNER.

1.06 GENERAL REQUIREMENTS

A. All duct covering, jackets, insulation, vapor barriers, adhesive, and mastics shall have flame spread rating of 25 or less and smoke spread rating of 50 or less when tested in accordance with ASTM E84.

PART 2–PRODUCTS

2.01 WRAP TYPE FIBERGLASS INSULATION

A. Acceptable manufacturer is Johns Manville Microlite XG, Owens Corning SOFTR, or Knauf Friendly Feel.

B. Insulation shall be resin-bonded fiberglass type conforming to ASTM C1290, Type 150.

C. Minimum nominal density shall be 1.5 lbs/ft^3.

D. K-factor shall not exceed 0.25 (btu-in)/(hr-ft^2-°F) at 75°F mean.

E. Insulation shall be free of formaldehyde.

2.02 RIGID BOARD FIBERGLASS INSULATION

A. Acceptable manufacturer is Manville Spin-Glas Series 814, Owens Corning Type 703, or Knauf Insulation Board.

B. Insulation shall be mineral fiber type conforming to ASTM C612.

C. Minimum nominal density shall be 3 lbs/ft^3.

D. K-factor shall not exceed 0.23 (btu-in)/(hr-ft^2-°F) at 75°F mean.

E. Insulation shall be rated for service to 450°F.

2.03 ADHESIVES, MASTIC, SEALANTS, AND REINFORCING MATERIALS

A. Products shall be compatible with surfaces and materials on which they are applied, and shall be suitable for use at operating temperatures of systems to which they are applied.

B. All adhesives used for ductwork insulation shall conform to ASTM C916, Type II.

C. Fiberglass Insulation Adhesive. Acceptable Manufacturers: Foster 85-60, Childers CP-127, and Duro Dyne SSG.

D. Acoustical Ductwork Adhesive. Acceptable Manufacturers: Foster 81-99, or equal.

E. Weather Barrier Breather Mastic:
   1. Acceptable Manufacturers: Foster 46-50 Weatherite, Childers Vi-Cryl CP-10/CP-11, or Vimasco WC-5.
   2. For equipment/piping insulation operating at 50°F or above, mastic water vapor permeance shall be greater than 1.0 perms at 1/16-inch dry film thickness conforming to ASTM E96.

F. Sealant for Metal Jacketing. Acceptable Manufacturers: Foster 95-44 Elastolar, Childers CP-76 Chil-Byl, Pittsburgh Corning 727.

2.04 JACKETING

A. PVC Jackets (PVJ):
   1. PVC film, gloss finish one side, semi-gloss other side.
   2. PVC film shall conform to FED L-P-535D, Composition A, Type II, Grade NT.
   3. PVC Jacketing shall be ultraviolet inhibited.
   4. Jacket thickness shall be minimum 0.03 inches.

B. Self-Adhering Jackets (SAJ):
   1. Acceptable manufacturers are 3M VentureClad 1577CW, or equal.
   2. Jackets shall be 5-ply, self-adhering multiple laminated waterproofing material with reflective aluminum foil, high density polymer films and cold weather acrylic adhesive providing zero (0.0) moisture permeance.
   3. Minimum material thickness shall be 6 mils.
   4. Minimum puncture resistance shall be 25 lbs conforming to ASTM D1000.

2.05 ACCESSORIES

A. All products shall be compatible with surfaces and materials on which they are applied, and be suitable for use at operating temperatures of the systems to which they are applied.

B. Adhesives, sealants, and protective finishes shall be as recommended by insulation manufacturer for applications specified.

C. Insulation bands shall be 3/4-inch wide, constructed of aluminum or stainless steel. Minimum thickness shall be 0.015-inch for aluminum and 0.010-inch for stainless steel.

D. Staples shall be clinch style.

E. Tack fasteners shall be stainless steel ring grooved shank tacks.

F. Joint sealants and metal jacketing sealants shall be non-shrinking and permanently flexible.

PART 3–EXECUTION

3.01 GENERAL

A. All insulation damaged during construction shall be replaced in accordance with these specifications.

B. All insulation shall be applied in accordance with the manufacturer's written recommendations. Destructive methods such as sheet metal screws are not acceptable.

C. Install insulation with smooth and even surfaces. Poorly fitted joints or use of filler in voids will not be accepted. Provide neatly beveled and coated terminations at all nameplates, uninsulated fittings, or at other locations where insulation terminates.

D. All duct insulation shall be continuous through walls, ceiling or floor openings and through sleeves except where firestop or firesafing materials are required.

3.02 WRAP TYPE FIBERGLASS INSULATION INSTALLATION

A. Insulation shall be installed per manufacturer's recommendations with mechanical fasteners. Seal all joints and fasteners with UL-labeled vapor-proof tape.

B. Provide finished edges at all access doors and ends.

3.03 RIGID BOARD FIBERGLASS INSULATION INSTALLATION

A. Provide finished edges at all access doors and ends of insulation.

B. Provide additional insulation trim pieces over flanged ductwork joints to completely insulate and seal to the thickness specified.

C. For exterior ductwork, insulate duct such that minimum thickness is maintained and is sloped/peaked to shed water.

D. Flexible connections from ducts to HVAC equipment shall not be insulated.

3.04 PROTECTIVE JACKET INSTALLATION

A. PVC Fitting Covers and Jackets (PVJ): Lap seams and joints a minimum of 2 inches and continuously seal PVC with welding solvent recommended by jacket manufacturer. Lap slip joint ends 4 inches without fasteners where required to absorb expansion and contraction. For sections where vapor retarding jacket is not required and jacket requires routine removal, tack fasteners may be used. Secure PVC fitting covers with tack fasteners. For systems requiring a vapor retarding jacket, apply a 1 1/2-inch band of mastic over ends, throat, seams and penetrations.

B. Self-Adhering Jackets (SAJ):
   1. Install according to manufacturer's recommendations. Cut allowing minimum 4-inch overlap on ends and 6 inches on longitudinal joints. Align parallel to surface. Remove release paper and press flat to surface to avoid wrinkles. Rub entire surface for full adhesion and sealing at joint overlaps. On exterior applications, provide a bead of compatible caulk along exposed edges.
   2. Wrap elbows, fittings, valves and butt joints with two layers of vapor retarding tape. Vapor retarding tape shall be compatible with the jacket material used.

3.05 DUCTWORK INSULATION

A. Provide insulation on new ductwork as indicated in the following schedule:

Service	Insulation	Jacket	Thickness
Exhaust/Relief Ducts from Exterior to 12 Inches Beyond Damper	Rigid Board Fiberglass	PVC or SAJ	2.0"
Intake and Exhaust Damper Frames	Rigid Board Fiberglass	PVC or SAJ	2.0"
New or Existing Odor Control Ductwork within Building	Wrap Type Fiberglass	PVC or SAJ	2.0"

3.06 SPECIAL AREAS

A. All areas indicated on the Drawings as "Corrosive" or NEMA 4x shall include PVJ or SAJ jackets.

END OF SECTION

SECTION 23 31 00

DUCTWORK

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Duct Pressure/System Class.
   2. Duct Materials.
   3. Hangers, Supports, and Gaskets
   4. Ductwork Fabrication.
   5. Elbows, Flanges, and Dampers.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

A. Submit under provisions of Section 01 33 00–Submittals.

B. Provide layout drawing for review prior to ductwork fabrication. Layout drawings shall be coordinated between all other trades prior to review.

1.03 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01 77 00–Contract Closeout.

B. Record actual locations and sizes of ducts and duct fittings. Record changes in fitting location sizes and types. Show additional fittings used.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with SMACNA–HVAC Duct Construction Standards–Metal and Flexible.

1.05 REGULATORY REQUIREMENTS

A. Construct ductwork to NFPA 90A standards.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain recommended minimum temperatures during and after installation of duct sealants.

C. Ductwork shall be stored indoors or in durable, waterproof, abovegrade packing.

1.07 DUCTWORK DESIGN

A. Duct layout and design shown on the drawings are based on design of supply, return and exhaust system components. Any changes to the design for installation shall be submitted to and approved by OWNER and ENGINEER. Proposed changes shall be submitted with layout and pressure drop calculations. CONTRACTOR shall be responsible for the cost of any changes to the duct system or any system components. Design calculations are required to be stamped by a Professional Engineer registered in the State of Kentucky.

PART 2–PRODUCTS

2.01 DUCT PRESSURE/SYSTEM CLASS

A. Ventilation Ductwork shall be constructed to the static pressure class as shown below, unless otherwise noted:
   1. Supply ductwork: 4-inch positive pressure class.
   2. Exhaust air ductwork: 2-inch negative pressure class.

B. All odor control ductwork shall be designed for a minimum working pressure of 15 inches WC Positive and 12 inches WC Negative pressure. The minimum wall thickness for all above-grade FRP duct shall be based on design safety factor of 10:1 (internal) and 5:1 (external).

2.02 DUCT MATERIALS

A. PVC Ducts:
   1. PVC piping (round duct) material less than 22 inches in diameter shall conform to ASTM D1784, Class 12454. PVC piping and fittings shall be PVC 1120, Schedule 80, high impact pipe conforming to ASTM D1785 with bells conforming to ASTM D2672. Solvent weld fittings shall conform to ASTM D2467, and for threaded, ASTM D2464. PVC round duct and fittings greater than or equal to 22 inches in diameter shall be of PVC conforming to ASTM D1784, Class 16444-D.
   2. All rectangular ductwork material shall conform to ASTM D1784, Class 16444-D. Ductwork shall be shop fabricated in accordance with SMACNA Thermoplastic Duct (PVC) Construction Manual. Duct shall be joined by hot gas fusion welding or solvent welding per manufacturer's instructions. PVC welders shall be DVS certified.
   3. All duct delivered to the job site shall be properly marked for type, grade, and design stress rating. Expansion joints shall be provided where needed. In general, all joints shall be solvent weld, except where flanges are required or as shown on the drawings or where transition to another pipe material is required.
   4. All exterior exposed duct shall be formulated with sufficient ultraviolet-light screeners to provide for long-term outdoor exposure with no deleterious effects.
   5. Entire duct shall be of PVC construction. PVC-coated materials are not acceptable.
   6. All PVC shall have a flame-spread rating of 25 or less in accordance with ULC S102.2.
   7. PVC fittings shall be flanged, solvent welded, or thermally welded with a machine expressly designed for that purpose.

B. Glass Fiber Reinforced Plastic (FRP) Ducts:
   1. Fiber reinforced plastic ducts shall be as manufactured by Midwestern Fabricators, ECS Environmental Solutions, Spunstrand, Composite Systems, or equal. Ductwork shall be glass fiber reinforced plastic conforming to ASTM D 2996, ASTM D 3982, and

SMACNA Fibrous Glass Duct Construction. Standards, with minimum 3/16-inch wall thickness.

2. Where indicated on drawings to be of nonflammable construction, duct shall be built to NBS PS 15 standards with inner epoxy resin rich carbon surfacing veil and a 100 mil corrosion barrier. Corrosion barrier is assumed to be sacrificial and is not included in the structural calculations. The balance of construction shall be filament wound with a 6-ounce cloth exterior.
3. FRP ducts shall, as a composite, not exceed a flame spread rating of 25 per UL 181.
4. The inner surface shall contain a 10 mil thick "C" veil saturated with a premium resin form above, (approximately 90% by weight resin) followed by a 100 mil corrosion barrier (two layers of 1 1/2 oz. chopped mat) with the same resin used on the 10 mil liner. The structural layer shall be as required for design service and shall be filament wound or contact molded using resin as detailed above. Duct exterior finish shall have a relatively smooth surface free of exposed fibers and shall contain an ultraviolet inhibiting agent in the gel coat. Gel coat shall be gray. All resin and joint material shall be suitable for 200°F service.
5. The fiberglass reinforced plastic (FRP) ductwork shall be designed and fabricated for odor control service to carry warm, moisture-laden air with hydrogen sulfide, mercaptans and other organic and inorganic compounds typically associated with wastewater treatment.
6. Maximum allowable deflection for any size ductwork shall be 1/2 inch between supports and for any size of duct under worse case operating conditions. Design calculations shall specifically address deflection.

C. All ductwork in corrosive areas shall be FRP or PVC.

2.03 HANGERS, SUPPORTS, AND GASKETS

A. Ductwork shall be supported in accordance with SMACNA–HVAC Duct Construction Standards–Metal and Flexible. Secure wire method of support is not acceptable.

B. Hangers:
1. Strip hangers shall be 316 stainless steel.
2. Hanger rod shall be 316 stainless steel. Rods shall be continuously threaded.

C. Supports:
1. Duct support material shall be 316 stainless steel.
2. Acceptable supports for trapeze hangers are steel angles or uni-strut. Exposed ductwork shall be supported by steel angle supports painted to match duct.
3. Riser supports shall be angles or channels secured to the sides of the duct with welds or fasteners.
4. Duct supports located on the exterior of the building shall be designed to include the weight of the duct and to withstand all applicable combinations of wind and seismic loading in accordance with the 2013 Kentucky Building Code. Exterior supports shall be located as shown on the Drawings and shall be of the "saddle type" support as per the standard detail shown on the Drawings. The locations of duct supports shown on the Drawings are approximate, and the CONTRACTOR shall be required to confirm the support requirements and locations.
5. The CONTRACTOR shall note that not all duct support locations are shown on the Drawings, and the CONTRACTOR shall follow the Specifications herein in locating additional supports as required. The CONTRACTOR shall be responsible for the design of additional supports and for the overall stability of the entire support system.

Support and hanger details and a detailed layout showing the location of all duct supports and hanger shall be submitted in the shop drawings. Support manufacturer shall be supplied with ductwork OD dimension prior to manufacturing the supports.

D. Hangers and supports for fiberglass duct shall be located as follows:

Duct Inside Diameter (Inches)	Maximum Span (Feet)
3-18	10
20-24	15
30-36	20

2.04 FRP DUCTWORK FABRICATION

A. Round Manufactured Ductwork and Fittings:
1. Fabricate and support in accordance with SMACNA–Thermoset FRP Duct Construction Manual. Duct material, gauges, reinforcing, joint types and sealing shall be in accordance with required pressure class in the standard.
2. Ductwork shall be constructed with elbows with centerline radius of 1 1/2 times the duct diameter, and male/female fittings. Conical tees, conical 45 degree laterals, conical bellmouth taps, and fittings shall be used.
3. Seal all joints airtight with gaskets.
4. All fittings shall be hand-lay up construction fabricated from the same resin and have the same strength as the FRP ductwork.
5. The internal diameter of all fittings shall be equal to the adjacent duct.
6. The tolerance on angles of all fittings shall be ±1 degree up to and including 24-inch diameter and ±1/2 degree for 30-inch diameter and above.

2.05 ELBOWS, FLANGES, AND DAMPERS

A. Elbows:
1. The centerline radius of all elbows shall be 1 1/2 times the diameter.
2. Elbows 24-inch diameter and smaller shall be smooth radius. Elbows 30-inch and larger shall be mitered. Provide a minimum of three mitered joints (5-piece) for all elbows above 45 degrees.

B. Flanges: Flanges must be drilled and have resin-coated bolt holes at the factory. Ductwork delivered with un-drilled flanges will be rejected.
1. Provide flanged connections to flexible connectors, expansion joints, vessels, demisters, fans, silencers and other locations as shown on the drawings.
2. Flanges shall be hand lay-up construction. Dimensions shall be in accordance with NBS PS 15-69 and the Duct Dimension Schedule.
3. Flanges shall be drilled in accordance with NBS PS 15-69, Table 2. Backs of flange face shall be flat so that washer seats fully on bolt face and flange backing.
4. Flange faces shall be perpendicular to the axis of the duct within 1/2 degree.
5. Flange faces shall be flat to within ±1/32 inch up to and including 18-inch diameter and flat within ±1/16-inch for 20-inch diameter and larger.
6. Gaskets shall be EPDM, full face and minimum 1/8 inch thickness.
7. All bolts, nuts, and washers shall be Type 316 stainless steel.

C. Dampers: Furnish and install, where indicated in the Drawings, FRP butterfly dampers. Dampers shall be fabricated from materials similar to associated ductwork. Supply damper type (isolation) as noted on the contract drawings or in this Specification.
   1. Round Fiberglass Reinforced Plastic Isolation Dampers:
      a. Velocity through Damper 6000 FPM.
      b. Pressure Rating 30-inches water column.
      c. Maximum Allowable Leakage: 5 cfm at 20-inch w.c.
   2. Materials:
      a. Bearings: Graphite filled Teflon.
      b. Blade: FRP Reinforced with a Corrosion Barrier on all exposed surfaces.
      c. Body: FRP, vinyl ester resin within a 100-mil internal corrosion barrier.
      d. Shaft: FRP.
      e. Resin System: All internal surfaces, including blade, shall have a BPO/DMA cure system to increase the corrosion resistance of surfaces exposed to chemical attack. No filler is allowed in the resin system, laminate must be translucent.
      f. Blade and Shaft Seals: Blade seal should be Viton, affixed to the blade. Seals molded into or affixed to the body are not acceptable. Shaft seal should be a Viton Quad-ring. All seals should be easily replaced by maintenance personnel. Shaft seals must be housed in an FRP packing gland. PVC compressing couplings utilized as shaft seals will not be allowed.
      g. Finish: Exterior coating to match the adjoining FRP equipment.
      h. Operator: Epoxy coated worm gear operator on all units, hand levers are not acceptable.
      i. Fasteners: 316 Stainless steel.
      j. Flanges: Thickness, OD, and Drilling to match duct flanges. See ductwork specification.
   3. Construction: Damper shall be manufactured in accordance with ASME RTP-1, ASTM 3982, and NBS PS 1569 standards. Allowable visual defects shall not exceed table two for in ASME RTP-1. Damper line shall be AMCA certified.

PART 3–EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install and seal ducts in accordance with SMACNA–Thermoset FRP Duct Construction Manual.

C. Duct sizes are inside clear dimensions.

D. Provide openings in ductwork to accommodate testing equipment and controllers. Where openings are provided in insulated ductwork, install a metal insulation sleeve of same material as ductwork.

E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities. Make all necessary incidental changes in cross-section, offsets, etc., to avoid interference with other equipment and supports.

F. Use double nuts and lock washers on threaded rod supports.

G. FRP and PVC ductwork shall have joints sealed per SMACNA Standards and manufacturer's recommendations. Duct shall be supported so that no hanging equipment fasteners or accessories penetrate ductwork.

H. During construction, provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

I. Any modifications to the ductwork shown on the drawings must be reviewed by ENGINEER prior to installation.

J. The weight of the ductwork shall be supported independently of connected equipment.

K. Inserts shall be coordinated with general contractor for installation concrete.

L. Where ducts pass through non-fire rated partitions in interior or exterior walls, provide flange on four sides on both sides of partition concealing opening. Flange shall overlap opening all around by 2 inches. Fill space with insulation if duct is insulated on either side of partition.

END OF SECTION

SECTION 23 33 00

AIR DUCT ACCESSORIES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Duct test holes.
   2. Flexible duct connections.
   3. Duct screens.
   4. Control dampers.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. NFPA 90A–Installation of Air Conditioning and Ventilating Systems.

B. SMACNA–HVAC Duct Construction Standards–Metal and Flexible.

1.03 SUBMITTALS

A. Submit under provisions of Section 01 33 00–Submittals.

B. Damper submittals shall include actual pressure drop, free area, and torque requirements for each type of damper provided.

1.04 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01 77 00–Contract Closeout.

B. Record actual locations of access doors, fire dampers, flexible duct connections, dampers, and screens.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle products in accordance with manufacturers recommendations and Section 01 60 00–Materials and Equipment.

1.06 WARRANTY

A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC14.04 and 14.05, as modified in the Supplementary Conditions, or Substantial Completion of the project.

PART 2–PRODUCTS

2.01 DUCT TEST HOLES

A. Provide Ventfabrics, Inc. No. 699 Instrument Test Holes, or equal, complete with gaskets and screw caps. Coordinate test hole height with insulation thickness.

B. On uninsulated ductwork only, plastic pull-tab centered tapered plugs may be used. Plugs shall be Caplugs CPT-3, or equal, with minimum diameter of 0.36-inch.

2.02 FLEXIBLE DUCT CONNECTIONS

A. Flexible duct connections in unrated spaces shall be Ventfabrics, Inc. "Ventglas®", or equal, neoprene-coated glass fabric. Fabric shall be suitable for continuous operation up to 200°F. Fabric shall have zero leakage at ±10 inches water column.

B. Flexible duct connections in rated spaces shall be Ventfabrics, Inc. "Ventel™", or equal, Teflon fluorocarbon resin-coated glass fabric. Fabric shall be suitable for continuous operation up to 500°F. Fabric shall have zero leakage at ±8 inches water column.

2.03 DUCT SCREENS

A. In PVC ductwork, provide screen equal to Harrison Machine and Plastic, 3/4 inches with border frame for protection, in lieu of metal. Install screen at sufficient angle to provide 60% of duct-free area through screen.

2.04 CONTROL DAMPERS

A. Outside Air Intake and Exhaust Outlet:
   1. Dampers shall be TAMCO Series 9000 SW, or equal, provided with an anodized coating and stainless steel linkage.
   2. Dampers shall be parallel blade.
   3. Extruded aluminum (6063T5) damper frame shall be thermally broken, minimum 0.080 inch thickness. Damper frame to be 4 inches deep and shall be insulated with polystyrene on four sides. Damper shall be rated at a leakage of less than 8.0 cfm per square foot at 4.0 inches of water column pressure differential at 20°F.
   4. Blades to be extruded aluminum (6063T5), internally insulated with non-CFC, expanded polyurethane foam and shall be thermally broken. Complete blade shall have an insulating factor of R-2.29 and a temperature index of 55.
   5. Blade gaskets shall be extruded EPDM; blade seals shall be silicone.
   6. Shaft to actuator shall be hex type, material to match damper construction.
   7. Side seals shall be silicone.
   8. Dampers shall be flanged to duct type. Clear opening in damper shall be same size as ductwork.

B. Actuators:
   1. Actuators shall be Belimo NFBUP, Honeywell MS4110, or Siemens GCA, maintenance-free actuator rated at minimum 88 in-lb. of torque. Dampers shall be power-to-open, spring-closed unless otherwise specified. Actuator shall be capable of accepting 120-volt power for operation and control.
   2. Actuators shall include electronic overload protection and visual position indication throughout range of motion.

3. Actuators shall include a manual override via a manufacturer-supplied hex crank.
4. Provide Greenheck, or equal, NEMA 4X plastic enclosure for actuators.
5. All actuators shall be direct-coupled to damper and mounted outside the air stream utilizing TAMCO motor mounting bracket model AL-0001, or equal unless otherwise noted. CONTRACTOR shall verify suitability of mounting bracket prior to ordering.
6. All actuators shall be of the same manufacturer. Manufacturer shall be responsible for furnishing quantity of actuators required to meet minimum damper torque rating, plus an additional 10% torque.

2.05 BALANCING DAMPERS

A. All balancing dampers shall be provided with locking devices to hold the dampers in a fixed position without vibration. Single blade dampers shall be stiffened to operate in a stable manner.

B. Dampers for PVC ductwork shall be Chicago Plastics Systems Blastgate or quadrant damper, or equal. Dampers shall be PVC with lockable blades for balancing.

C. Dampers for FRP ductwork shall be Spunstrand ZL, or equal. Dampers shall be of FRP construction and designed for balancing applications.

PART 3–EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards–Metal and Flexible. Refer to Section 23 31 00–Ductwork for duct construction and pressure class.

B. Division 23 shall be responsible for coordinating with testing and balancing agency and providing test holes in all locations required for testing and balancing agency to complete their scope of work.

C. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment. Duct-to-duct gap shall be approximately 4 inches.

END OF SECTION

SECTION 23 34 13

HVAC FANS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Centrifugal fans.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. AMCA 99–Standards Handbook.

C. AMCA 210–Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.

D. AMCA 300–Reverberant Room Method for Sound Testing of Fans.

E. AMCA 301–Method for Calculating Fan Sound Ratings from Laboratory Test Data.

F. ASTM B117–Standard Practice for Operating Salt Spray (Fog) Apparatus.

G. NFPA 70–National Electrical Code.

H. NEMA MG 1–Motors and Generators.

1.03 QUALITY ASSURANCE

A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the drawings.

B. Fans shall bear AMCA-certified rating seals.

C. Electrical components shall be UL listed for the service specified.

D. Electrical components and work shall be in accordance with the National Electric Code.

1.04 SUBMITTALS

A. Submit under provisions of Section 01 33 00-Submittals.

B. Include data concerning dimensions, required clearances, capacities, materials of construction, ratings, weights, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification. Include plans, elevations, sections, and details.

C. Submittal shall include fan-specific performance curves showing airflow, head, and motor horsepower.

D. Submit manufacturer's installation instructions and recommendations.

E. Submittals must be specific to this project. Generic submittals will not be accepted.

F. Hanging and support requirements should follow the recommendations in the manufacturer's installation instructions.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the site in such a matter as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids and lifting lugs, if required for handling.

B. Materials damaged by the elements should be packaged in such a matter that they could withstand short-term exposure to the elements during transportation.

C. Store materials in clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.

D. Use all means necessary to protect equipment before, during, and after installation.

E. All scratched, dented, and otherwise damaged units shall be repaired or replaced as directed by OWNER.

F. Motors, shafts and bearings shall be protected from weather and dust.

1.06 OPERATION AND MAINTENANCE DATA

A. Include installation instructions, assembly views, lubrication instructions, recommended maintenance schedule and activities.

B. Include replacement and spare parts lists.

1.07 WARRANTY

A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC14.04 and 14.05, as modified in the Supplementary Conditions, or Substantial Completion of the project.

PART 2–PRODUCTS

2.01 CENTRIFUGAL FANS

A. Acceptable manufacturers are PLASTEC®, or equal.

B. Materials:
   1. Housings–Polypropylene: Housings shall be constructed of strong high-density UV treated polypropylene for maximum corrosion resistance. Housing shall be made of one single piece to completely avoid leaks. Split molded housings are not acceptable. Screws holding housing to back plate shall be stainless steel. Housing shall be reversible and rotatable to any of the 8 standard discharge positions. Metal in the air stream is not acceptable.
   2. Impeller/Wheel–Polypropylene: Impeller/Wheels shall be of forward-curved type and constructed of uniformly molded polypropylene blades. Impeller/Wheels shall be both electronically and dynamically balanced. Blower impeller/wheel shall be supplied with a motor shaft bushing and hubcap made of polypropylene to protect shaft end. Blower impeller/wheel shall be suitable for RPM of up to 3450.

C. Motor Support: Polypropylene motor support for complete motor protection shall be provided.

D. Motors: Motors shall be direct drive and of heavy-duty ball bearing type for continuous duty with voltage as specified. Motors shall be totally enclosed fan cooled (TEFC). Motor shall be UL and CSA approved for safety.

E. Performance: Fan performance shall be based on tests conducted in accordance with AMCA 210-85 and ISO 5801.

F. Warranty: This equipment is warranted to be free from defects in material and workmanship for two years from date of original shipment. Any units or parts which prove to be defective and are reported during the warranty period will be replaced at our option when returned to our factory, transportation prepaid by the sender. Deterioration of wear by heat, abrasive action, chemicals, improper installation or operation or lack of normal maintenance shall not constitute defects, and are not covered by warranty. Transportation to and from the factory for warranty repairs is not covered under warranty and is the sole responsibility of the owner of the equipment.

PART 3–EXECUTION

3.01 INSTALLATION

A. Install units level and plumb, maintaining manufacturer's recommended clearances and tolerances.

B. Install in accordance with manufacturer's instructions and approved submittals. Test for proper operation and adjust until satisfactory results are obtained.

C. Install units with vibration isolators as recommended or supplied by manufacturer.

D. Provide flexible duct connections on all duct connections to unit in accordance with Section 23 33 00–Air Duct Accessories.

E. Provide all mounting hardware and accessories necessary for complete installation.

F. Touch-up, repair or replace damaged products at no additional cost to OWNER.

G. Drawings and specifications are based on the scheduled manufacturer and model number. CONTRACTOR shall be responsible for the cost of any changes because of substitutions or alternates of other manufacturers or model numbers including but not limited to, structural, mechanical, and electrical work. CONTRACTOR shall pay all costs for revisions of drawings by ENGINEER. Any changes shall be coordinated and provided at no additional cost to OWNER.

END OF SECTION

SECTION 23 37 08

LOUVERS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Louvers.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. ADC 1062–Certification Rating and Test Manual.

B. AMCA 500–Test Method for Louvers, Dampers, and Shutters.

C. ARI 650–Air Outlets and Inlets.

D. ASHRAE 70–Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.

E. NFPA 90A–Installation of Air Conditioning and Ventilating Systems.

1.03 QUALITY ASSURANCE

A. Performance of air terminals shall be in accordance with ADC 1062.

B. Louvers shall be tested and certified in accordance with AMCA 500 and shall bear the AMCA seal.

1.04 SUBMITTALS

A. Submit under provisions of Section 01 33 00–Submittals.

B. Include a louver schedule that includes louver model, screen type, screen location, louver size, finish type, free areas, face velocity, and pressure drop for each louver.

C. Submit manufacturer's installation instructions and recommendations.

D. Submit color selection chart with submittal.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the site in such a matter as to protect the materials from shipping and handling damage.

B. Materials damaged by the elements should be packaged in such a matter that they could withstand short-term exposure to the elements during transportation.

C. Store materials in clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.

D. Use all means necessary to protect equipment before, during, and after installation.

E. Scratched, dented, and otherwise damaged units shall be repaired or replaced as directed by OWNER.

PART 2–PRODUCTS

2.01 LOUVERS (EXTRUDED ALUMINUM)

A. Acceptable louvers are Greenheck ESD 635, or equal. See drawings for sizes and locations.

B. Blades and frame shall be extruded aluminum 6063-T5 alloy and 0.08-inch thickness.

C. Blades shall be 35 degree drainable type spaced at 4 inches on center. Louver shall be capable of a velocity of 1,077 fpm with no water penetration. Performance shall include AMCA-certified air and moisture penetration data and louver shall bear the AMCA seal. Vertical and horizontal mullions and connections between panels shall not be exposed.

D. Provide channel frame unless noted otherwise on the drawings.

E. Provide aluminum screen on louver in accordance with louver schedule on drawings. All fastenings shall be stainless steel or aluminum in accordance with louver schedule on drawings.

F. Louver free area shall be equal to or greater than attached ductwork and damper free area.

G. Louvers shall be furnished with 3 coats of 70% Kynar 500 finish with custom color selected by OWNER. Submit manufacturer's standard color chart with shop drawings.

PART 3–EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify ENGINEER of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install units level and plumb, maintaining manufacturer's recommended clearances and tolerances.

B. Install in accordance with manufacturer's instructions, drawing details, and approved submittals.

C. Clean surface of louvers after installation.

END OF SECTION

SECTION 23 37 23

HVAC GRAVITY VENTILATORS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Gravity roof ventilators.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. NFPA 90A–Installation of Air Conditioning and Ventilating Systems.

1.03 QUALITY ASSURANCE

A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the drawings.

B. Performance of air terminals shall be in accordance with ADC 1062.

C. Louvers shall be tested and certified in accordance with AMCA 500 and shall bear the AMCA seal.

1.04 SUBMITTALS

A. Submit under provisions of Section 01 33 00–Submittals.

B. Include data concerning dimensions, required clearances, capacities, materials of construction, ratings, weights, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification. Include plans, elevations, sections, and details.

C. Submittal shall include a ventilator schedule that includes ventilator model, screen type, ventilator size, finish type, free area, face velocity, and pressure drop for each ventilator.

D. For product requiring color selection, provide a hard copy color chart to OWNER for color selection.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the site in such a matter as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids and lifting lugs, if required for handling.

B. Materials damaged by the elements should be packaged in such a matter that they could withstand short-term exposure to the elements during transportation.

C. Store materials in clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.

D. Use all means necessary to protect equipment before, during, and after installation.

E. All scratched, dented, and otherwise damaged units shall be repaired or replaced as directed by OWNER.

PART 2–PRODUCTS

2.01 GRAVITY ROOF VENTILATORS

A. Acceptable manufacturers are Greenheck, Carnes, or equal.

B. Gravity roof ventilator shall be heavy gauge aluminum construction and provided with roof curb and bird screen.

C. Manufacturer shall furnish, and CONTRACTOR shall install, a prefabricated insulated aluminum roof curb with wood blocking to match roof pitch to allow for a level curb on roof. Curb shall be sized for 1/4-inch clearance on all sides between curb and ventilator mounting flange. Curb insulation shall be 1-inch thick, 3 pounds per cubic foot rigid fiberglass board. Curb height for low side of curb shall be 12 inches unless otherwise indicated. For roof ventilators on pitched roof, manufacturer shall furnish a pitched cricketed roof curb. Roof curb shall be provided with a foam seal and an aluminum liner.

D. Provide corrosion resistant polyester finish. Color to be selected by OWNER. Submit manufacturer's standard color chart with shop drawings. Roof curb shall be coated to match ventilator.

PART 3–EXECUTION

3.01 INSTALLATION

A. Install units level and plumb, maintaining manufacturer's recommended clearances and tolerances.

B. Install in accordance with manufacturer's instructions and approved submittals.

C. Provide all mounting hardware and accessories necessary for complete installation.

D. Drawings and specifications are based on the scheduled manufacturer and model number. CONTRACTOR shall be responsible for the cost of any changes because of substitutions or alternates of other manufacturers or model numbers including but not limited to, structural, mechanical, and electrical work. CONTRACTOR shall pay all costs for revisions of drawings by ENGINEER. Any changes shall be coordinated and provided at no additional cost to OWNER.

END OF SECTION

SECTION 23 82 39

UNIT HEATERS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Electric Unit Heaters.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.

B. ARI 410–Forced Circulation Air-Cooling and Air-Heating Coils.

C. NFPA 70–National Electrical Code

1.03 QUALITY ASSURANCE

A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the drawings.

B. Electrical components shall be UL listed for the service specified.

C. Electrical components and work shall be in accordance with the National Electric Code.

D. Coil performance shall be certified in accordance with ARI 410.

1.04 SUBMITTALS

A. Submit under provisions of Section 01 33 00–Submittals.

B. Include data concerning dimensions, required clearances, capacities, materials of construction, ratings, weights, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification. Include plans, elevations, sections, and details.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the site in such a matter as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids and lifting lugs, if required for handling.

B. Materials damaged by the elements should be packaged in such a matter that they could withstand short-term exposure to the elements during transportation.

C. Store materials in clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.

D. Use all means necessary to protect equipment before, during, and after installation.

E. All scratched, dented, and otherwise damaged units shall be repaired or replaced as directed by OWNER.

1.06 WARRANTY

A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the earlier of either the date established for partial utilization in accordance with GC14.04 and 14.05, as modified in the Supplementary Conditions, or Substantial Completion of the project.

PART 2–PRODUCTS

2.01 ELECTRIC UNIT HEATERS

A. CONTRACTOR shall provide electric heaters of the type, size, capacity, and accessories as listed on the equipment schedule. All units shall be UL listed.

B. All electric unit heaters shall be factory-assembled and tested.

C. Electric Unit Heaters (Explosion-proof):
1. Acceptable manufacturers are INDEECO, or equal.
2. The cabinet shall be constructed of heavy gauge epoxy-coated steel with a louvered grille and wall-mounting bracket.
3. Unit shall include an epoxy-coated aluminum propeller fan with direct-drive, totally enclosed motor for operation in a Class I, Division 1, Groups C and D hazardous environment.
4. Unit shall include a manual reset thermal cutout to protect the element, an integral thermostat, and a thermal fan delay.
5. Line voltage thermostat shall be provided by Division 26.
6. Unit-mounted equipment disconnect shall be ABB OT Series provided by manufacturer suitable for Class I, Division 1, Groups C and D locations and meet the requirements of Division 26.
7. Mount bottom of units 8 feet 0-inch above finished floor.
8. Heat exchanger shall be sealed liquid-to-air-type with a field-replaceable immersion heating element. Heat transfer fluid shall be propylene glycol. Heat exchanger shall include a pressure relief valve. Heat exchanger shall be of 316 stainless steel construction with aluminum fins.

D. Electric Wall Heaters (EWH):
1. Acceptable manufacturer is QMark, or equal.
2. Furnish and install a steel cabinet for surface mounting on a standard block wall as shown on drawings. Provide a cabinet with 16 gauge steel grille bars and finished in baked enamel.
3. Provide a direct-drive propeller fan and permanently lubricated totally enclosed motor.
4. Provide steel-finned metal sheath electric heating elements.

5. Provide manual reset thermal overheat protection to disconnect power in the event of overheating. Provide an integral, tamper-resistant thermostat. Provide integral contactors and disconnects.

PART 3–EXECUTION

3.01 INSTALLATION

A. Install units level and plumb, maintaining manufacturer's recommended clearances and tolerances.

B. Install in accordance with manufacturer's instructions and approved submittals. Test for proper operation and adjust until satisfactory results are obtained.

C. Provide all mounting hardware and accessories necessary for complete installation.

D. Installation of all equipment furnished under this Contract shall be supervised by a qualified representative of the equipment manufacturer. All equipment shall be placed in operation, and plant operators/building maintenance personnel shall be trained to the satisfaction of OWNER by a qualified representative of the equipment manufacturer. OWNER may videotape training presentations given by manufacturer's representatives. Final payment for various items of equipment will not be made by OWNER until the equipment is operating to their satisfaction.

E. Drawings and specifications are based on the scheduled manufacturer and model number. CONTRACTOR shall be responsible for the cost of any changes because of substitutions or alternates of other manufacturers or model numbers including but not limited to, structural, mechanical, and electrical work. CONTRACTOR shall pay all costs for revisions of drawings by ENGINEER. Any changes shall be coordinated and provided at no additional cost to OWNER.

END OF SECTION

SECTION 26 05 00

GENERAL ELECTRICAL REQUIREMENTS

PART 1–GENERAL

1.01 SUMMARY

A. Work includes general requirements for all electrical work.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern Work in this section.

1.02 REFERENCES

A. ANSI/NFPA 70–National Electrical Code (NEC).

B. ANSI/IEEE C2–National Electrical Safety Code.

1.03 CONTRACT DOCUMENTS

A. Any equipment roughed in improperly and/or not positioned on implied centerlines or as dictated by good practice shall be repositioned at no cost to OWNER.

B. The drawings are generally diagrammatic, and CONTRACTOR shall coordinate the Work so that interferences are avoided. Provide all offsets in conduit, fittings, etc., necessary to properly install the work. All offsets, fittings, etc., shall be provided without additional expense to OWNER.

C. Hazardous or classified locations, where referenced in the Specifications or on the Drawings, shall be as defined in the NEC.

1.04 REGULATORY REQUIREMENTS

A. Conform to ANSI/NFPA 70.

B. Conform to ANSI/IEEE C2.

C. The rules and regulations of the federal, state, local, and civil authorities and utility companies in force at the time of execution of the Contract shall become a part of this specification.

D. Obtain electrical permits and inspections from authority having jurisdiction. Costs for permits and inspections shall be by CONTRACTOR.

1.05 CODES AND ORDINANCES

A. CONTRACTOR is expected to know or to ascertain, in general and in detail, the requirements of all codes and ordinances applicable to the construction and operation of systems covered by this Contract. CONTRACTOR shall know or ascertain the rulings and

interpretations of code requirements being made by all authorities having jurisdiction over the work to be performed by them.

B. In preparing a Bid, CONTRACTOR shall include the cost of all items and procedures necessary to satisfy the requirements of all applicable codes, ordinances, and authorities, whether or not these are specifically covered by the drawings and specifications. All cases of serious conflict or omission between the drawings, specifications, and codes shall be brought to ENGINEER's attention, as herein before specified. CONTRACTOR shall carry out work and complete construction as required by applicable codes and ordinances and in such a manner as to obtain approval of all authorities whose approval is required.

C. When requested by ENGINEER, CONTRACTOR shall provide written calculations to show compliance with applicable codes or the Contract Documents. This shall include, but not be limited to, conduit and wire sizing, junction and pull box fill and sizing, manhole/handhole sizing, conductor derating, and voltage drop. CONTRACTOR shall indicate calculation method used as well as compliance with applicable code, drawing, or specification.

1.06 EQUIPMENT PROVIDED UNDER OTHER DIVISIONS

A. Included in this Contract are electrical connections to equipment provided under other divisions. CONTRACTOR shall refer to final shop drawings for equipment being furnished under other divisions, for exact location of electrical equipment, and the various connections required.

1.07 ELECTRICAL DISTRIBUTION SYSTEM

A. Provide a complete electrical distribution system consisting of components indicated on the drawings or specified herein including, but not limited to:
   1. Feeders, branch wiring, and electrical distribution equipment.
   2. All control wiring.
   3. Access panels and access doors for access to equipment installed by Division 26.
   4. Wiring between system components if equipment is not prewired.
   5. Lighting fixtures, lighting controls, and associated wiring.
   6. Support system design and supports for electrical raceways.
   7. Code-required disconnects.

B. CONTRACTOR shall connect the following equipment furnished by Divisions 11 and 15 consisting of components indicated on the drawings or specified herein, including, but not limited to:
   1. Unit heater fans.
   2. HVAC unit starters.
   3. Air intake and exhaust fans.
   4. Motor-actuated valves scum pipes.

C. Provide balancing and adjusting of electrical loads.

D. CONTRACTOR shall instruct OWNER's representative in the operation and maintenance of all equipment. The instruction shall include a complete operating cycle on all apparatus.

E. Provide miscellaneous items for a complete and functioning system as indicated on the drawings and specified herein.

F. A partial list of work not included in Division 16 is as follows: Painting (except as otherwise specified herein).

1.08 NOISE

A. Eliminate any abnormal noises that are not considered by ENGINEER to be an inherent part of the systems as designed. Abnormal buzzing in equipment components will not be acceptable.

1.09 DRAWINGS

A. The drawings indicate approximate locations of the various items of the electrical systems. These items are shown approximately to scale and attempt to show how these items should be integrated with building construction. Locate all the various items by on-the-job measurements in conformance with Contract Documents and cooperation with other trades.

B. Prior to locating equipment, confer with ENGINEER as to desired location in the various areas. In no case should equipment locations be determined by scaling drawings. Relocate equipment and bear cost of redoing work or other trades' work necessitated by failure to comply with this requirement.

C. In certain instances, receptacles, switches, light fixtures, or other electrical devices and equipment, etc., may be relocated. Where relocation is within 10 feet of location shown on the drawings, and when CONTRACTOR is informed of necessary relocation before work is begun on this portion of the job, the relocation shall be at CONTRACTOR's expense.

D. The drawings are schematic in nature and are not intended to show exact locations of conduit, but rather to indicate distribution, circuitry, and control.

1.10 EXISTING UNDERGROUND UTILITIES

A. The drawings show approximate location of existing underground electrical based on OWNER-provided record drawings. CONTRACTOR shall excavate and verify the location of all underground electrical prior to installing new electrical equipment and prior to making modifications to existing electrical. This shall include, but not be limited to, feeders to structures and equipment, branch circuit wiring, phone and communication cabling, instrument wiring, and control wiring. CONTRACTOR shall temporarily relocate existing underground electrical to keep the existing facility in operation and for any new construction, and all costs for relocating existing electrical shall be included in the Bid.

1.11 SUBMITTALS

A. CONTRACTOR shall submit to ENGINEER for approval prior to beginning work, shop drawings on the equipment and materials proposed to be furnished and installed. See Section 01 33 00–Submittals for requirements.

B. CONTRACTOR shall, in addition, submit drawings and/or diagrams for review and for job coordination in all cases where deviation from the Contract drawings are contemplated because of job conditions, interference or substitution of equipment, or when requested by ENGINEER for purposes of clarification of CONTRACTOR's intent. CONTRACTOR shall also submit detailed drawings, rough-in sheets, etc., for all special or custom-built items or equipment. Drawings and details under this section shall include, but not be limited to, the

following, where applicable to this project: Electrical interconnection wiring diagrams; see Section 26 24 19–Motor Control and Section 26 09 00–Controls and Instrumentation.

C. These drawings and diagrams shall show applicable electrical switch and breaker sizes as well as the manufacturer's name and catalog number for each piece of equipment used.

D. Equipment and material submittals must show sufficient data to indicate complete compliance with Contract Documents as follows:
   1. Proper sizes and capacities.
   2. That the item will fit in the available space in the manner that will allow proper service. Provide 1/4-inch scale plan view and elevations of all electrical equipment showing equipment layouts and clearances.
   3. Construction materials and finishes.

E. When the manufacturer's reference numbers are different from those specified, provide correct cross-reference number for each item. The shop drawings shall be clearly marked and noted accordingly.

F. When equipment and items specified include accessories, parts, and additional items under one designation, shop drawings shall be complete and include all components.

G. See additional requirements of shop drawings under Division 1–General Requirements.

PART 2–PRODUCTS

2.01 STANDARD PRODUCTS

A. All equipment and products shall be of new manufacture per applicable specifications.

B. All equipment shall be UL and NEMA approved.

C. Unless specified otherwise, major distribution equipment shall be by the same manufacturer.

D. All equipment and wiring shall be selected and installed for conditions in which it will perform (e.g., general purpose, weatherproof, raintight, explosionproof, dustproof, or any other special type).

2.02 SUBSTITUTION OF MATERIALS AND EQUIPMENT

A. While it is not the intention of OWNER to discriminate against any manufacturer of equipment which may be equivalent to specified equipment, a strict interpretation of such equivalency will be exercised in considering any equipment offered as a substitute for specified equipment. CONTRACTOR shall submit with each request for approval of substitute material or equipment sufficient data to show conclusively that it is equivalent to that specified in the following respects:
   1. Performance:
      a. Capacity at conditions and operating speeds scheduled shall be equal to or greater than that of the specified equipment.
      b. Energy consumption at the point of rating shall not exceed that of the specified equipment.

c. Vibration and noise production at the point of rating shall not exceed that of the specified equipment.

2. Materials of construction.
3. Gauges, weights, and sizes of all portions and component parts.
4. Design arrangements, methods of construction, and workmanship.
5. Coatings, finishes, and durability of wearing parts.
6. National reputation of the manufacturer as a producer of first quality equipment of the type under consideration.
7. Availability of prompt, reliable, and efficient service facilities franchised by or affiliated with the equipment manufacturer. This shall include the maintenance of local stocks of critical replacement parts equal to those maintained for the specified equipment.

B. Requests for substitution shall include CONTRACTOR's reason for the request.

C. If ENGINEER does not consider the items equivalent to those specified, CONTRACTOR shall provide those specified.

D. See General Conditions for additional requirements.

PART 3–EXECUTION

3.01 CONTINUITY OF SERVICE

A. CONTRACTOR shall provide and maintain continuous services (power, controls, alarms, etc.) during the entire construction period.

B. No service shall be interrupted or changed without permission from OWNER. Written permission shall be obtained before any work is started.

C. When interruption of service is required, all persons concerned shall be notified and a prearranged time agreed upon. Notice shall be a minimum of 72 hours prior to the interruption.

3.02 CLEANUP AND REMOVAL OF RUBBISH

A. All lighting and appliance panelboards, motor starter and disconnect switch enclosures, junction boxes, and pullboxes shall be cleaned of debris and wires neatly arranged with surplus length cut off before installation of covers.

B. Where louvers are provided in enclosures, louvers shall be vacuumed free of all dust and dirt. Where air filters are provided in equipment such as control panels, motor control centers and transformers, CONTRACTOR shall replace all filters with new at the time of final completion.

C. All new lighting fixture lenses and lamps (interior and exterior fixtures) shall be cleaned at the time of installation, and all lens exteriors shall be cleaned just prior to final inspection.

D. Equipment shall be thoroughly cleaned of all stains, paint spots, dirt, and dust. All temporary labels not used for instruction or operation shall be removed.

3.03 CONCRETE WORK

A. All cast-in-place concrete for new electrical equipment bases shown on the drawings shall be provided by CONTRACTOR, except where specifically noted to be provided by others. All new equipment shall be set on 3 1/2-inch minimum leveling slabs including MCCs, free-standing enclosures, switchgear, etc. Pads shall be 3 inches larger than equipment being supported.

B. Concrete shall comply with Section 03 30 00–Cast-In-Place Concrete.

C. Provide all anchor bolts, metal shapes, and templates to be cast in concrete or used to form concrete for support of electrical equipment.

3.04 PAINTING

A. All painting of electrical equipment shall be done by CONTRACTOR unless equipment is specified to be furnished with factory-applied finish coats.

B. All electrical equipment shall be provided with factory-applied prime finish, unless otherwise specified.

C. If the factory finish on any equipment furnished by CONTRACTOR is damaged in shipment or during construction, the equipment shall be refinished by CONTRACTOR.

D. One can of touch-up paint shall be provided for each different color factory finish which is to be the final finished surface of the product.

3.05 CAULKING

A. Caulk with a caulking sealant where indicated on the electrical drawings or hereinafter specified.

B. Caulking sealant shall be silicone construction sealant as manufactured by General Electric or two-part polysulfide conforming to the requirements and bearing the seal of the Thiokol Chemical Corporation.

C. Caulking sealant shall contain no acid or ingredients that will stain stone, corrode metal, or have injurious effect on painting. It shall be colored to match adjacent surroundings.

D. Caulking shall be performed by craftsman skilled at such work.

3.06 BUILDING ACCESS

A. CONTRACTOR shall arrange for the necessary openings in the building to allow for admittance of all apparatus.

B. When the installation requires openings and access through existing construction and the openings are not provided, CONTRACTOR shall provide the necessary openings.

3.07 COORDINATION

A. Provide wiring for all motors and all electrically powered or electrically controlled equipment.

B. All starters, disconnects, relays, wire, conduit, push buttons, pilot lights, and other devices for the power and control of motors or electrical equipment shall be provided by CONTRACTOR except as specifically noted elsewhere in these specifications or on the drawings.

C. Where starters or other devices are provided by others, they shall be connected and wired by CONTRACTOR.

D. CONTRACTOR's drawings and specifications shall show number and horsepower rating of all motors furnished, together with their actuating devices. Should any change in size, horsepower rating, or means of control be made to any motor or other electrical equipment after the Contract is awarded, any additional costs because of these changes shall be the responsibility of CONTRACTOR.

E. All motors shall be provided for starting in accordance with local utility requirements and shall be compatible with starters as specified herein or under the various trades' sections of these specifications.

F. CONTRACTOR shall provide all line voltage power and control wiring (100 volts and above), including temperature control wiring for operation, control, and supervision of all motorized equipment, including wiring between motor starters, and control devices as specified herein and as shown on the drawings. Low-voltage control wiring (below 100 volts) shall be provided by CONTRACTOR supplying the equipment that has low-voltage wiring, unless otherwise noted. CONTRACTOR shall provide raceways for all low-voltage wiring.

G. CONTRACTOR shall connect and wire all apparatus according to approved wiring diagrams furnished by the various trades.

H. Motors 1/2 hp and larger shall be NEMA rated 460 volts, three-phase, 60 Hz, unless otherwise shown. Motors 1/3 hp and below shall be 115 volts, single-phase, 60 Hz, unless otherwise shown.

3.08 EXCAVATION AND BACKFILL

A. Backfilling of all trenches beneath concrete floor and stair slabs within building shall be accomplished with gravel fill and shall be specially compacted to same density as surrounding area. Backfill of exterior trenches shall be compacted granular fill, unless otherwise noted. Compaction shall meet the requirements of Section 31 23 00–Excavation, Fill, Backfill, and Grading. Refer to Section 26 05 33–Conduit for additional requirements associated with PVC conduit installed in earth.

B. Lines passing under foundation walls shall have a minimum of 1 1/2-inch clearance.

C. Care shall be taken so as not to disturb the bearing soil under foundations.

3.09 EQUIPMENT ACCESS AND LOCATION

A. CONTRACTOR shall coordinate work of this division with that of other divisions so that all systems, equipment, and other components of the building will be installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. This means adequate access to all equipment not just that installed under this division. Any components for the electrical systems that are installed without regard to the above shall be removed and relocated as required to provide adequate access at CONTRACTOR's expense.

B. Where various items of equipment and materials are specified and scheduled, the purpose is to define the general type and quality level, not to set forth the exact trim to fit the various types of ceiling, wall, or floor finishes. Provide materials that will fit properly the types of finishes actually installed.

C. All equipment, junction and pull boxes, and accessories shall be installed to permit access to equipment for maintenance. Any relocation of conduits, equipment, or accessories to provide maintenance access shall be accomplished by CONTRACTOR at no additional cost.

D. Electrical equipment, devices, instruments, hardware, etc., shall be installed with ample space allowed for removal, repair, calibration or changes to the equipment. Ready accessibility to equipment and wiring shall be provided without moving other equipment that is to be installed or that is already in place.

E. Locate electrical outlets and equipment to fit the details, panels, decorating, or finish of the space. ENGINEER shall reserve the right to make minor position changes of the outlets before the work has been installed. Verify door swings before installing room lighting switch boxes, and install boxes on the latch side of door unless noted otherwise.

3.10 WORKMANSHIP

A. All work shall be performed in compliance with the NEC.

B. Install work using procedures defined in NECA Standard of Installation.

C. Location of process equipment as shown on the drawings is approximate.

D. Utilization equipment and control devices required under these specifications shall be mounted in a code-approved manner.

E. Locations of utilization equipment and control devices as shown on the drawings are within 10 feet of actual positions. Any mounting of this equipment within this 10-foot distance will be performed at no additional cost to OWNER.

F. Unless otherwise noted, conduit shall be fastened to building structure or equipment framework and not placed on the floor.

G. Where materials, equipment apparatus, or other products are specified by manufacturer, brand name, and type or catalog number, such designation is to establish standards of desired quality and style and shall be the basis of the Bid.

H. Materials and equipment of the types for which there are National Board of Fire Underwriters Laboratories (UL) listings shall be so labeled and shall be used by CONTRACTOR.

3.11 AREA CLASSIFICATION

A. As noted on the drawings.

3.12 MODIFICATIONS TO EXISTING CONSTRUCTION

A. Alterations:
   1. Alter, extend, and reconnect conduits as necessary.
   2. Reconnect existing conduits that were reused, cut, or exposed because of construction as quickly as possible.
   3. Where wiring is involved, new wires shall be "pulled in" between the nearest available accessible reused outlets to the extent allowed by the governing code.
   4. Provide new conduits for wires if they cannot be "pulled in" to existing conduits.
   5. All new conduits, wiring, and electrical items shall be connected to the existing systems so as to function as a complete unit.
   6. Where existing electrical equipment, devices, fixtures, electrically operated items, etc., interfere with any remodeling work, they shall be removed and reinstalled in another location to avoid such interferences. All existing and relocated equipment shall be left in good operating condition.

B. CONTRACTOR shall remove all electrical equipment, conduit, and wiring associated with the structures, equipment, and control systems specified herein and/or shown on the Drawings to be removed.

C. Include in Bid removal of existing electrical material and equipment as specified hereinafter, as noted on the drawings, or as needed by field conditions.

D. Provide stainless steel cover plates for all existing recessed outlet and junction boxes not being reused. Seal or cap all existing conduit penetrations not being reused.

END OF SECTION

SECTION 26 05 19

WIRE

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Wire.
   2. Terminal blocks and accessories.
   3. Wiring connections and terminations.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 QUALITY ASSURANCE

A. Manufacturers of Wire: Firms regularly engaged in the manufacture of electrical wire products of the types and ratings needed whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.

D. UL Labels: Provide electrical raceways, wire, connectors, outlets, switches, etc., which have been listed and labeled by Underwriters Laboratories.

E. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.03 SUBMITTALS

A. Submit shop drawings and product data under the provisions of Section 01 33 00–Submittals.

B. Submit shop drawings for wiring system including layout of distribution devices, branch circuit conduit and cables, circuiting arrangement, and outlet devices.

C. Submit manufacturer's instructions.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Provide factory-wrapped, waterproof, flexible-barrier material for covering wire on wood reels, where applicable, and weather-resistant fiberboard containers for factory-packaging of wire, connectors, outlets, boxes, lamps, fuses, etc., to protect against physical damage in transit. Do not install damaged wire or other material; remove from project site.

B. Store wire and other material in factory-installed coverings in a clean, dry, indoor space which provides protection against the weather.

PART 2–PRODUCTS

2.01 WIRE

A. All wire for permanent installation shall be new stranded copper delivered to project in unopened cartons or reels, except where specifically noted and be UL listed for the use intended. No wire smaller than 12 AWG shall be used unless specifically noted. The use of multiconductor cable is NOT ALLOWED.

B. Motor circuit branch wiring and associated control wiring:
   1. Insulation type shall be THHN (indoors, nonVFD application).
   2. Minimum size for motor control wiring shall be 14 AWG.
   3. Control wiring for supervisory equipment shall be shielded, sized per equipment manufacturer's recommendations, or as shown on drawings.

C. All wiring within control panels, supervisory control centers, and motor control centers that does not extend outside of the enclosure or the motor control center bucket shall be insulation-type MTW, minimum size 16 AWG.

D. Wiring in dry locations shall be THHN. Wiring in damp and wet locations shall be XHHW-2. Damp and wet locations shall include, but not be limited to, washdown areas, unconditioned spaces, exterior buried conduits, wet wells, and exterior locations.

E. Refer to Section 26 05 53–Electrical Identification for required wire insulation color coding and conductor labeling requirements. Initial phase color shall be used throughout the run, even for switch legs. Colors must meet code requirements for each class voltage. Do not duplicate colors, including neutral, on different voltages.

F. All wiring for intrinsically safe circuits shall be light blue. Refer to Section 26 09 00–Controls and Instrumentation for additional wire color requirements.

G. Branch circuit wiring for exit lights, emergency lights, and exterior lights in excess of 75 feet shall be minimum 10 AWG. Circuits 150 feet or over shall be sized for a maximum 2% voltage drop.

2.02 LOW-VOLTAGE WIRING (LESS THAN 100 VOLTS)

A. Low-voltage wiring specified in this section shall be applicable to all systems installed that utilize low-voltage wiring where such wiring is not specified in other technical sections.

B. All wiring shall have copper conductors with 300-volt insulation rating and meet the requirements of NEC Article 725.

C. All conductors must be suitable for the application intended. Conductors 16 AWG and larger shall be stranded. Conductors 18 AWG and smaller may be solid or stranded.

D. Control Cable for Class 1 Remote Control and Signal Circuits: Individual conductors twisted together, shielded, and covered with an overall PVC jacket. Cable shall be UL listed, temperature rated, and plenum or nonplenum rated for the application as required in the National Electrical Code.

E. Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits shall be constructed, UL listed, temperature rated, and plenum or nonplenum rated for the application as required in the NEC Article 725.

2.03 WIRING CONNECTIONS AND TERMINATIONS

A. Provide crimp type UL or ETL listed terminations for 6 AWG and smaller stranded conductor connections to electrical devices and equipment such as receptacles, switches, and terminal strips. Crimp devices shall be Sta-kon, or equal.

B. Provide insulated, silicone-filled spring wire connectors with plastic caps for 8 AWG conductors and smaller. Connectors shall be King Silicone-Filled Safety Connectors, or equal. Spring wire connectors shall only be allowed in junction, outlet, or switch boxes. Spring wire connectors are not allowed for terminating motor conductors.

C. All feeder cable connections to motor leads up to 600 volts shall be insulated and sealed with factory-engineered kits. Motor connection kits shall consist of one-hole copper compression lugs for 6 AWG and larger, split-bolt connector for 8 AWG and smaller, and motor-lead pigtail splice kit. Individual components shall be as follows:
   1. Split-bolt connectors shall be for use with copper conductors only.
   2. One-hole copper compression lugs shall be as manufactured by 3M, or equal, 30000 series. Lug size shall be selected based on motor and feeder wire sizes installed.
   3. Pigtail splice kit shall consist of one-hole lug cover, silicone grease, and mastic sealing strip. Pigtail splice kit shall have locking pins for conductors 2 AWG and larger. Kit shall be as manufactured by 3M, or equal, 5300 series, and be selected based on motor, feeder, and lug sizes installed.

D. No splices will be allowed unless reviewed by ENGINEER. Where allowed, provide in-line splices for all conductor connections, 6 AWG and larger. Splice crimp component shall be Burndy UGSKIT2 or equal. Splice shall be made with crimp tool by manufacturer that allows expanded conductor ranges. Splice insulation component shall be Raychem heavy-wall, low-voltage tubing, type WCSM, or equal.

2.04 TERMINAL BLOCKS AND ACCESSORIES

A. Terminal Blocks: ANSI/NEMA ICS 4: UL listed or UL recognized under UL 467, UL 486E, UL1059, and UL 1953 (power terminals only).

B. Power Terminal Blocks: Unit construction type, closed-back type, tin-plated copper, with tubular pressure screw connectors, rated 600 volts as manufactured by Allen-Bradley 1492-PDL, or equal.

C. Signal and Control Terminal Blocks:
   1. General-Purpose Terminal Blocks:
      a. Terminal blocks shall be rated up to 600 volts AC/DC.
      b. Terminal blocks shall accept center-mounted jumper bars without increasing the installed space.

c. Terminal blocks shall be Allen-Bradley Bulletin 1492-J, or equal.
d. Terminal block color shall be gray.

2. Grounding Terminal Blocks:
   a. Terminal blocks shall be Allen-Bradley Bulletin 1492-JG, or equal.
   b. Terminal block color shall be green/yellow.
3. Disconnect-type Terminal Blocks (300-Volt Class):
   a. Terminal blocks shall be feed-through type with a knife-blade disconnect.
   b. Terminal blocks shall be Allen-Bradley Bulletin 1492-JKD, or equal, depending on the application.
   c. Terminal block color shall be gray.
4. Fuse-type Terminal Blocks with Indicator (300-Volt Class):
   a. Terminal blocks for applications from 100 to 300 volts AC shall be Allen-Bradley Bulletin 1492-H4, or equal, with neon blown-fuse indicator.
   b. Terminal blocks for applications from 10 to 50 volts AC/DC shall be Allen-Bradley Bulletin 1492-H5, or equal, with LED blown-fuse indicator.
   c. Terminal block color shall be black.
5. Fuse-type Terminal Blocks with Indicator (600-Volt Class):
   a. Terminal blocks shall be Allen-Bradley Bulletin 1492-J3P, or equal, with associated indicating-type fuse plug.
   b. Terminal block color shall be gray.
6. Terminal Blocks for Power Meters and Current Transformers: Provide test-disconnect terminal blocks for disconnecting, shorting, and testing current transformers and for disconnecting and testing voltage sensing inputs. Provide test-disconnect terminals for individual current transformer or voltage sensing installations, and provide a group of terminals for all current transformer and voltage sensing inputs for each power meter installation.
   a. Provide a pair of terminal blocks for each current transformer including one feed-through terminal block, one sliding disconnect terminal block with a cross-connection short-circuit slider. The pair of terminal blocks shall include the following:
      (1) Feed-through terminal block shall be Weidmüller Model WTD 6/1 EN, or equal.
      (2) Sliding disconnect terminal block shall be Weidmüller Model WTL 6/1 EN, or equal.
      (3) Short-circuit slider shall be Weidmüller Model WKS 2/2, or equal. The short-circuit slider shall cover the terminal block conductor screws on the meter-side of the terminal blocks when in the non-shorting position, and expose the terminal block conductor screws when slid into the shorting position.
      (4) Provide two cross-connection sliders Weidmüller Model STB, or equal, with connecting sleeves Weidmüller Model VH, or equal. Provide one slider fixing screw Weidmüller Model BS, or equal. Connecting sleeves and fixing screws shall be color coded for each current transformer.
   b. Provide disconnecting terminal blocks for each voltage sensing and neutral connection. The terminal blocks shall include the following:
      (1) Sliding disconnect terminal block shall be Weidmüller Model WTL 6/1 EN, or equal.
      (2) Provide one cross-connection slider Weidmüller Model STB, or equal, with connecting sleeve Weidmüller Model VH, or equal, for each voltage sensing and neutral connection terminal block. Provide one slider fixing screw Weidmüller Model BS, or equal. The neutral connecting sleeve shall be a different color than the voltage sensing connecting sleeves.

c. Terminal block colors shall be gray. Provide end plates and end brackets as required to complete the test-disconnect terminal block assembly.

7. Terminal blocks shall have self-locking screw compression clamps rated for the size of conductors being terminated and upstream overcurrent protection for each application.
8. The same manufacturer and style of terminal block shall be used throughout the entire project for all applications.
9. Terminal blocks shall have tin-plated copper current bars and tin-plated steel screws. Terminal housings shall be completely finger safe from all live circuits and be constructed of self-extinguishing material with minimum UL 94-V0 flammability rating.
10. Terminal blocks shall accept pre-printed, snap-in labeling cards on both sides without increasing the installed space. Provide terminal block manufacturer's end barriers and screw-type retainers for all terminal block groupings.
11. Terminal blocks shall mount on standard DIN rail and shall be able to be removed without removing adjacent terminal blocks.
12. Multi-level terminal blocks and stacked, single-level terminal block installations are not acceptable.

D. Refer to Section 26 05 53–Electrical Identification for terminal block labeling requirements.

PART 3–EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which the work is to be installed and notify CONTRACTOR of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 GENERAL WIRING METHODS

A. Install electrical wire and connectors in accordance with the manufacturer's written instructions, applicable requirements of the NEC, the National Electrical Contractors Association's "Standard of Installation," and in accordance with recognized industry practices so that products serve the intended functions. Use appropriate wiring methods and materials for the equipment or environment.

B. Stranded conductors shall be terminated using crimp-type devices specified herein. Conductors may not be wrapped around a terminal screw.

C. Place an equal number of conductors for each phase of a circuit in same raceway.

D. Torque conductor connections and terminations with calibrated torque wrench to manufacturer's recommended values. Provide permanent marking on lug, bolt, nut, or connection for conductors larger than 4 AWG.

E. Splice only in junction or outlet boxes. Splicing is not allowed in disconnects, manholes, motor control centers, panelboards, control panels, equipment, etc. Avoid splices between terminals of interconnecting power and control wiring.

F. Spring wire connectors shall only be used in junction, outlet, or switch boxes. Equipment wireways (e.g., motor control centers, panelboards, disconnects, switchgear, etc.), and

control panels shall not have any spring-wire connectors installed; all terminations shall be on terminal strips.

G. Neatly train, lace, and tie wrap all wiring inside boxes, equipment, control panels, MCCs, and panelboards.

H. Make conductor lengths for parallel circuits equal.

I. The same color shall be used for each numbered wire throughout its entire length.

J. Terminate all wiring on terminal blocks in control panels, VFD enclosures, starter cubicles, and similar equipment. This shall include all spare or unused wires.

K. Provide a dedicated neutral for each branch circuit or feeder requiring a neutral. Ampacity of neutral conductor shall match that of the branch circuit or feeder.

L. Do not use a pulling means that can damage the raceway.

M. Signal wiring (below 100 volts) and intrinsically safe wiring must be in a conduit separate from power and/or control wiring (over 100 volts). Signal wire shall include, but not be limited to, loop-powered devices, voice and data communications, and communication wiring (i.e., DeviceNet, RS-232, etc.). Analog wiring shall be in a conduit separate from all other wiring. Intrinsically safe wiring shall be separated and identified in accordance with Article 504 of the NEC.

N. Control wiring (e.g., internal thermal overloads, lockout stops, etc.) to motors utilizing VFDs shall be in a conduit separate from motor power wiring.

O. Provide junction or pull boxes to facilitate the "pulling in" of wires or to make necessary connections. All raceways and apparatus shall be thoroughly blown out and cleaned of foreign matter prior to pulling in wires.

P. Thoroughly clean wires before installing lugs and connectors.

Q. Make splices, taps, and terminations to carry full capacity of conductors without perceptible temperature rise.

R. Terminate spare conductors within equipment, MCCs, control panels, etc., on terminal strips and label as "SPARE." Spare wiring in pull or junction boxes may be terminated with electrical tape and labeled as "SPARE." All spare conductor labels shall indicate where the conductors terminate. Refer to Section 26 05 53–Electrical Identification, for additional requirements.

S. Feeder connections to motors shall be installed within the motor junction box utilizing factory engineered kits as specified herein. Spring wire connectors are not allowed for connections to motors.

3.03 GENERAL LOW-VOLTAGE WIRING METHODS (LESS THAN 100 VOLTS)

A. Low-voltage wiring installation requirements specified herein shall be applicable to all systems installed that utilize low-voltage wiring where such wiring installation is not specified in other technical sections.

B. Low-voltage wiring shall be installed in conduit. Unless noted in other specification sections, low-voltage wiring located in office buildings above suspended ceilings shall be allowed to be installed free air, as specified herein if the cable meets NEC requirements for the application.

C. Do not use wire smaller than 14 AWG for control wiring greater than 60 volts, or 18 AWG for voltages less than 60 volts. All sizes subject to NEC 725 requirements.

D. Low-voltage cable splices shall only be allowed in junction boxes.

3.04 WIRING INSTALLATION IN RACEWAYS

A. Pull all conductors into a raceway at the same time. Use UL-listed wire-pulling lubricant for pulling 4 AWG and larger wires. Wax-based pulling lubricant is not allowed unless it includes a Teflon additive.

B. Install wire in raceway after interior of building is enclosed, watertight, and dry, and all mechanical work likely to injure conductors has been completed.

C. Completely and thoroughly swab raceway system before installing conductors.

D. Conductors No. 6 AWG and larger shall be pulled into conduits by hand or by utilizing a tugger with built-in tension meter. Other motorized machines of any type are NOT ALLOWED for any wire pulling. CONTRACTOR shall provide a report to ENGINEER for each pull indicating maximum tension reached during the pull along with manufacturer's maximum pulling tension.

E. Conductors shall be installed in conduit system in such a manner that insulation is not damaged, conductors are not overstressed in pulling, and walls are not damaged. No splices are permitted except in junction boxes or outlet boxes.

F. CONTRACTOR shall observe code limitation on the number and size of wires in an outlet box. CONTRACTOR shall either lay out work so that the wires do not exceed the particular box limitation or provide larger boxes approved for additional capacity.

G. Panel riser feeder conductors shall be identified with colored tape at panel lugs. The same phase relation shall be maintained throughout.

H. Circuiting is indicated diagrammatically on the drawings.

3.05 TERMINAL BLOCK INSTALLATION

A. A maximum of one conductor shall be installed on the field-wired side of each terminal block. If rated to accept more than one conductor, a maximum of two conductors shall be installed on the enclosure-wired side of each terminal block. Provide additional terminal blocks and shorting jumpers as required.

B. Provide a separate ground-type terminal block for each shielded-cable drain conductor.

C. Provide ten percent spare terminal blocks for each type of connected terminal block, minimum five spare terminal blocks total. For each grouping of terminal blocks, provide 25% spare DIN rail space.

D. Maintain a minimum of 1 1/2 inches between terminal blocks and adjacent devices and enclosure wireways.

3.06 FIELD QUALITY CONTROL

A. Inspect wire for physical damage and proper connection.

B. Prior to energizing, check conduit, raceways, outlet boxes, and wire for continuity of circuitry and for short circuits. Correct malfunction when detected.

C. Subsequent to wire hookups, energize circuitry and demonstrate functionality in accordance with these specifications.

D. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

E. Perform field inspection and testing according to provisions of this section.

3.07 ACCEPTANCE TESTS

A. CONTRACTOR shall furnish all materials, labor, and equipment necessary for the acceptance tests specified herein. Acceptance tests shall be performed in the presence of OWNER or OWNER's representative and must be passed before final acceptance of the work.

B. CONTRACTOR shall be responsible for powered tests of each field-installed device unless specifically noted otherwise. CONTRACTOR shall be responsible for device operation as powered from its power source and signals as received at the I/O modules.

C. Operation Test: By operational testing, OWNER will give final acceptance of the wiring system when all of the wiring is considered a complete system. All equipment shall function and operate in the proper manner as indicated in the details of the specifications and on the drawings. All motors shall be properly connected to protective devices, and motor rotation shall be in the correct direction.

D. At the request of OWNER's representative, demonstrate by test the compliance of the installation with these specifications and drawings, the National Electrical Code, and the accepted standards of good workmanship. These tests shall include operation of equipment, continuity of the conduit system, grounding resistance and insulation resistance.

E. A written record of performance tests on electrical and control and instrumentation systems and equipment shall be supplied to OWNER. Such tests shall show compliance with governing codes.

F. The transformer, feeder, and subfeeds to the lighting panels shall be completely phased out as to sequence and rotation. Phase sequence shall be A-B-C as follows:

1. Front-to-rear, top-to-bottom, or left-to-right when facing equipment.
2. Phasing shall be accomplished by using distinctive colors for the various phases. The same color or variation of it shall be used for a particular phase throughout the building and project.

3.08 WIRE INSTALLATION SCHEDULE

A. Install all wiring in raceways except as otherwise noted. This includes all low-voltage wiring such as temperature control, instruments, phone, network, fiber optic, etc.

END OF SECTION

SECTION 26 05 23

INSTRUMENT AND COMMUNICATION WIRE AND CABLE

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: This specification contains the requirements for instrument wire and cable as opposed to electrical power wire and cable.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 QUALITY ASSURANCE

A. Standards: Comply with standards specified in this section as listed in Division 01.

B. Qualifications of Installers: Skilled workers who are thoroughly trained and experienced in the necessary crafts, and who are completely familiar with the specified requirements and the methods needed for proper performance of the work.

1.03 PRODUCT HANDLING

A. Instrument cable shall be furnished in lengths as necessary.

B. Reels, coils, or package rolls of instrument cable shall be identified with the project name and other tagging identification as called for.

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

B. Submit an electronic copy of the fiber optic cable testing report.

C. Furnish three hard copies and one electronic copy of the final approved fiber optic cable test report to OWNER.

1.05 QUALIFICATIONS

A. CONTRACTOR shall have at least four years of experience in the installation of similar systems. CONTRACTOR shall provide documentation upon request to certify that all assigned staff have attended training courses corresponding to the type of cabling and equipment specified herein.

B. CONTRACTOR shall currently be licensed to install low voltage electronic cabling systems in the state of the project.

C. CONTRACTOR shall currently meet all manufacturer's requirements for the provision and installation of all equipment specified herein.

PART 2–PRODUCTS

2.01 SHIELDED PAIR CABLING FOR ELECTRONIC INSTRUMENTS

A. Shielded pair cabling shall have stranded, tinned-copper conductors twisted with 2-inch lay.

B. Insulation of conductors shall be 15 mil, 90°C minimum PVC, rated for 300 volts. Materials shall equal or exceed UL 13 requirements for physical properties.

C. Color coding shall be manufacturer's standard or as stated.

D. The outer jacket shall be flame-retardant and weather- and ultraviolet-resistant PVC, 35 mils thick, and 80°C minimum rating. The outer jacket shall contain a ripcord and shall equal or exceed the requirements of UL 1277. Cable shall be UL labeled as power-limited circuit cable.

E. A 100% coverage shield shall be applied over the insulated conductors. The shield shall consist of a 0.85 mil minimum thickness aluminum mylar tape. A stranded, tinned-copper drain wire shall be furnished in continuous electrical contact with the shield.

F. Single-pair shielded cables shall be Belden 9316, or equal.

2.02 SHIELDED MULTICONDUCTOR CABLING FOR ELECTRONIC INSTRUMENTS

A. All multiconductor cables for instruments shall be in accordance with this section unless there are unusual requirements by the instrument vendor.

B. Multiconductor cables shall have No. 20 AWG, stranded tinned-copper conductors, arranged in pairs or triples, twisted with 1 1/2 inches to 2 1/2 inches staggered lay.

C. Insulation of conductors shall be 15 mil, 90°C minimum PVC rated for 300 volts. Materials shall equal or exceed UL 13 requirements for physical properties. Pairs or triples shall be numbered consecutively.

D. Color coding shall be manufacturer's standard or as stated.

E. An overall 100% coverage shield consisting of 2.35 mil aluminum mylar tape shall cover the conductors with a No. 20 AWG, 7-strand, tinned copper drain wire in continuous electrical contact with the shield.

F. The outer jacket shall be flame-retardant and ultraviolet-resistant PVC, 50 mils minimum thickness and 80°C minimum rating. The outer jacket shall contain a ripcord and shall equal or exceed the physical characteristics of UL 1277. Cable shall be UL labeled as power-limited cable.

G. For flow meters or other signals requiring low cross-talk characteristics, each pair or triple shall have a separate, insulated, 100% coverage-shield consisting of an 0.85 mil minimum thickness aluminum mylar tape with No. 22 AWG, 7-strand, tinned copper drain wire in continuous electrical contact with the shield.

2.03 INDUSTRIAL ETHERNET CABLE

A. 600-Volt Rated Shielded Cable:
   1. For communication with plant SCADA Systems and equipment in supervisory control centers, motor control centers, switchgear, switchboards, control panels, etc., over 300 volts, and other areas or raceways with power wiring over 300 volts, provide 600-volt-rated, 4-pair, shielded (F/UTP), twisted-pair cables. Transmission characteristics of the cables shall meet full Category 6 performance criteria as defined by the ANSI/TIA-568-C.2 standard.
   2. Cable conductors shall be minimum 23 AWG with PVC jacket and aluminum foil shield with 100% coverage. The cable outer jacket shall be industrial-grade PVC with a maximum overall cable diameter of 0.34 inches. Cable shall be CMR rated, UL listed, 600 V UL AWM rated, and be Belden 7953A or equal.
   3. Cable jacket color shall be red.
   4. Provide a shielded RJ45 connector on one end of each cable and an unshielded RJ45 connector on the other end of each cable.

B. 300-Volt Rated Shielded Cable:
   1. For communication with plant SCADA Systems and equipment in supervisory control centers, motor control centers, switchgear, switchboards, control panels, etc., under 300 volts, and other areas or raceways with power wiring under 300 volts, provide 300 volt-rated, 4-pair, shielded (F/UTP), twisted-pair cables. Transmission characteristics of the cables shall meet full Category 6 performance criteria as defined by the ANSI/TIA-568-C.2 standard.
   2. Cable conductors shall be minimum 23 AWG with PVC jacket and aluminum foil shield with 100% coverage. The cable outer jacket shall be industrial-grade PVC with a maximum overall cable diameter of 0.29 inches. Cable shall be CMR rated, UL listed, and shall be Systimax Solutions 1271B, or equal.
   3. Cable jacket color shall be slate.
   4. Provide a shielded RJ45 connector on one end of each cable and an unshielded RJ45 connector on the other end of each cable.

C. Patch cables shall be provided premanufactured by the cable manufacturer or connector manufacturer in sufficient length to connect the associated equipment to any port on the equipment, patch panel, or switch. Field-attached plugs shall be insulation displacement type and shall be by the same manufacturer as the cable.

PART 3–EXECUTION

3.01 INSTALLATION REQUIREMENTS AND SPECIAL CONSIDERATIONS

A. Shielded pair, thermocouple, industrial Ethernet cabling specified in this section shall be installed in conduit, and may not be run free-air or in nonmetallic tubing such as innerduct.

B. Armor may be necessary on instrument cables installed in ladder-type trays or in nonmagnetic electrical ducts:
   1. Electronic instrument wiring, pairs and triplets, and thermocouple lead extension wire, single pair. There shall be a steel wire armor of 24 gauge AISI 1006 soft annealed steel wire covering the inner jacket.

2. Electronic instrument wiring, multiconductor cables, and thermocouple lead extension wire, multipair. There shall be a flexible interlocked galvanized steel armor covering the inner jacket.
3. The armor shall be covered by a flame-retardant and weather- and ultraviolet-resistant PVC, outer jacket 35 mil minimum thickness and 80°C minimum rating. The outer jacket shall contain a ripcord and shall equal or exceed the physical characteristics of UL 1277. Cable shall be UL labeled as power limited cables.

C. Individual lead wires and/or multipair cables used in "emergency" or "critical" service shall normally be installed in underground electrical duct banks.

D. Where circumstances prohibit underground installation of "emergency" or "critical" circuits, the lead wires and/or multipair cables shall conform to the appropriate sections of this specification, except they shall be armored and have an asbestos layer between the inner jacket and the armor to permit the wires to withstand an open-flame temperature of 1,700°F for a minimum of 20 minutes without interrupting the "critical" or "emergency" signals.

3.02 GROUNDING

A. The shielded connection for shielded network cabling shall be connected at the network switch or patch panel and not at the field device connection. Ground patch panels and network switches accepting shielded network cables.

B. Shielded cabling shall be installed in accordance with manufacturer's instructions and to minimize electrical noise and interference to associated instruments. Refer to instrument manufacturer's instructions for additional requirements.

C. Ends of signal wires shall be sealed to prevent the migration of moisture into the cable and to prevent unintentional grounding of the shield at the open end. Seal signal wires using a minimum 1-inch piece of heat-shrink tubing installed over PVC jacket and individual wires, and heat-shrink to a watertight fit.

D. All shields must be grounded.

E. Shields shall be grounded at one point only. Shielded cabling shall be isolated and left open at the instrument. The single-pair electronic instrument cable shields shall be connected to the multipair electronic instrument cable overall shield in the field junction box. The multipair electronic cable overall shield shall be grounded to the control room instrument ground.

F. Shielded pair thermocouple cable shields shall be connected to the individual pair shields of multipair thermocouple cables in the field junction boxes to maintain shield continuity for each individual shielded pair from the thermocouple to the input component in the control room. The multipair thermocouple cable overall shield shall be isolated and left open in the field junction box. The individual thermocouple pair shields shall be grounded at the thermocouple connection head. The multipair thermocouple cable overall shield shall be grounded at the control room instrument ground. The other ends of the individual thermocouple pair shields and the multipair thermocouple cable overall shield shall be isolated and left open.

G. When multipair electronic instrument cable is specified with individual shielded pairs to minimize crosstalk on flow meters or other pulsating signal applications, the shielding and

grounding of the individual pair shields and the multipair overall shield shall be the same as for thermocouple applications.

H. Cable shield grounds shall be isolated from control system signal grounds, except at instrument system grounding electrodes.

I. The control room instrument ground shall be separate and isolated from the electrical power grounding system.

J. See grounding riser diagram in the drawings for additional requirements.

END OF SECTION

SECTION 26 05 26

SECONDARY GROUNDING

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Electrical equipment and raceway grounding and bonding.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

PART 2–PRODUCTS

2.01 MATERIALS

A. Ground Fittings: O-Z/Gedney, Type ABG, CG, TG, KG, GBL, or equal.

PART 3–EXECUTION

3.01 INSTALLATION

A. Compression-type connectors shall be installed with the manufacturer recommended tools. Compression dies shall emboss index on the connector when installed correctly. An indenter crimp shall be made on ground rods prior to connection of grounding conductor.

B. Provide a separate insulated equipment grounding conductor for each feeder and branch circuit. Provide a dedicated neutral conductor sized to match the circuit or feeder conductors for each feeder or branch circuit requiring a neutral. Terminate each end on a grounding lug, bus, or bushing.

C. Bond together system neutrals, service equipment enclosures, exposed noncurrent carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and cold water plumbing systems.

D. Ground system, transformer neutrals, and equipment as required by code and local ordinances.

E. All feeder neutrals shall be connected to neutral at only one point in the MCC or switchgear.

F. Include ground for grounded receptacles, light fixtures, telephone system, motors, and equipment items shown on the drawings.

G. Flexible connections do not qualify for ground. All flexible connections must have separate green ground wire from motor base, lighting fixture, or equipment frame to conduit system.

H. Provide a separate grounding conductor system for the grounding of all lighting fixtures and devices installed in the same conduit as the branch circuit conductors. Ground conductors shall be individually connected at each fixture or device.

I. All equipment in NEMA 4X areas that are fed from circuits in PVC conduit shall be provided with a separate green ground wire that is terminated at the metallic conduit system and the equipment.

J. Separately derived systems as defined by the National Electrical Code shall be grounded as such. This shall include, but not be limited to, 4-wire transformers and 4-wire standby generators.

END OF SECTION

SECTION 26 05 29

SUPPORTING DEVICES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Conduit and equipment support members.
   2. Fastening hardware.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 QUALITY ASSURANCE

A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

PART 2–PRODUCTS

2.01 MATERIAL

A. Support Members:
   1. 316 stainless steel or fiberglass in exterior locations and NEMA 4X areas. PVC-coated steel in Class I locations and where used with PVC-coated conduit.
   2. Galvanized steel in all other areas.

B. Hardware:
   1. Stainless steel in exterior locations, NEMA 4X areas, and Class I locations.
   2. Galvanized steel in all other areas.

C. Manufacturers: Unistrut P-1000, B-line, Superstrut, or equal.

PART 3–EXECUTION

3.01 INSTALLATION

A. All supporting devices and support structures shall be constructed such that the structure adequately supports the load of the equipment installed on it including any wind and/or snow loads. Provide additional support members to those shown on the Drawings to adequately support load.

B. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors or support members. Do not use spring steel clips and clamps. Provide standoffs or suspended ceiling grid bridge supports as specified in other technical sections.

C. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchors on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.

D. Where support members are used for conduit, cutoff ends shall be ground smooth. Cutoff PVC-coated support members shall be ground smooth and touched up with PVC coating material from the manufacturer.

E. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.

F. Do not use powder-actuated anchors.

G. Do not drill structural steel members.

H. Fabricate supports with welded end caps and all welds and surfaces ground smooth for neat appearance. Use hexagon head bolts with steel spring-lock washers under all nuts.

I. In wet locations, install free-standing electrical equipment on concrete pads. Anchor all equipment to adjacent walls with standoffs and caulk.

J. Install surface-mounted cabinets and panelboards with a minimum of four anchors.

K. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.

L. Do not use chain, wire rope, or perforated strap hangers.

M. All welds shall be continuous and ground smooth.

END OF SECTION

SECTION 26 05 33

CONDUIT

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Rigid metal conduit and fittings.
   2. Rigid aluminum conduit.
   3. PVC externally and internally coated galvanized rigid metal conduit.
   4. Polyvinyl chloride conduit and fittings.
   5. Liquidtight flexible metal conduit and fittings.
   6. Conduit seals and special fittings.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. ANSI C80.1–Electrical Rigid Steel Conduit (ERSC).

B. ANSI C80.5–Electrical Rigid Aluminum Conduit (ERAC).

C. ANSI/NEMA FB 1–Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.

D. NEMA RN 1–Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal.

1.03 QUALITY ASSURANCE

A. Manufacturers of Raceways: Firms regularly engaged in the manufacture of electrical raceways of the types and capacities required whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that for the project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.

D. UL Labels: Provide electrical cable, raceways, wire, connectors, outlets, switches, etc., which have been listed and labeled by Underwriters Laboratories.

E. Prior to shipment to the site, all conduit provided shall be new, unused material and may not have been stored outdoors or exposed to weather.

F. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Provide color-coded thread protectors on the exposed threads of threaded rigid metal conduit.

B. Handle conduit carefully to prevent end damage and to avoid scoring the finish.

C. Store conduit inside and protect from weather. When necessary to store outdoors, elevate well above grade and enclose with durable, waterproof wrapping.

PART 2–PRODUCTS

2.01 RIGID METAL CONDUIT AND FITTINGS

A. Rigid Steel Conduit: ANSI C80.1 and UL6. Heavy wall seamless tubing with hot-dipped galvanized coating.

B. Conduit bodies for rigid steel conduit shall be as manufactured by Appleton, Form 35, or equal, and be constructed of stamped steel for sizes 2 inches and under, and cast malleable iron for sizes over 2 inches. Conduit bodies shall have built-in pulling rollers, domed gasketed covers, and stainless steel screws. Covers for conduit bodies must have bolts that thread into the conduit body. Snaptight and wedgenut covers are not allowed. CONTRACTOR shall select body style and size according to application.

C. Rigid Aluminum Conduit: ANSI C80.5 and UL6. Heavy wall.

D. Conduit bodies for rigid aluminum conduit shall be as manufactured by Appleton, Form 85, or equal, and be constructed of pressure-cast, copper-free aluminum for sizes 2 inches and under, and sand-cast, copper-free aluminum for sizes over 2 inches. Conduit bodies shall have built-in pulling rollers, domed gasketed covers, and stainless steel screws. Covers for conduit bodies must have bolts that thread into the conduit body. Snaptight and wedgenut covers are not allowed. CONTRACTOR shall select body style and size per application.

E. PVC-coated conduit and fittings shall be internally and externally hot dipped galvanized rigid metal conduit with hot dipped galvanized threads and PVC coating. PVC coating shall be UL listed with rigid metal conduit as the primary means of corrosion protection for the conduit, and PVC coating shall have an external 40 mil thickness with an internal 2 mil urethane coating. Acceptable manufacturers shall be Plasti-bond RedH_2OT by Robroy Industries, Ocal-Blue by Thomas & Betts, or equal. PVC-coated conduit and fittings shall meet the following listings and manufacturing standards, without exception. All installers shall be field-certified from the factory for installation and shall provide proof of certification:
1. ANSI C80.1.
2. UL6.

3. NEMA RN1.

F. Conduit bodies for PVC-coated rigid conduit shall be as manufactured by Plasti-bond RedH_2OT by Robroy Industries, Ocal-Blue by Thomas & Betts, or equal, and have a 40 mil PVC exterior coating and 2 mil red urethane interior coating. Conduit bodies shall be Form 8 style or pulling elbow and include domed, gasketed covers and stainless steel screws. Covers for conduit bodies must have bolts that thread into the conduit body. Snaptight and wedgenut covers are not allowed. CONTRACTOR shall select body style and size according to application.

G. Fittings and Conduit Bodies: ANSI/NEMA FB 1 and UL 514B; threaded-type material to match conduit. For hazardous locations, fittings and conduit bodies shall meet the requirements of UL 886. Split couplings are not allowed.

H. Supports: One-hole or two-hole pipe straps may be used for surface-mounted conduit. Where one-hole straps are used, provide conduit clamp and back spacer. Where standoffs are required, provide pipe straps and supporting devices as specified in Section 26 05 29–Supporting Devices. Support material shall match that of the conduit type provided.

2.02 POLYVINYL CHLORIDE CONDUIT (PVC) AND FITTINGS

A. Conduit: Heavy wall rigid, Schedule 40, Schedule 80 where noted, UL listed for underground, encased, and aboveground applications. PVC conduit installed in exterior locations shall be UV resistant.

B. Conduit bodies for PVC conduit shall be as manufactured by Carlon, or equal, and be suitable for use with Schedule 40 or Schedule 80 PVC conduit. Conduit bodies shall have smooth hubs, textured lids, and foam-in-place gaskets. CONTRACTOR shall select body style and size per application.

C. Supports: Two-hole nonmetallic clamps or conduit support straps may be used for surface-mounted conduit. Where standoffs are required, provide pipe straps and supporting devices as specified in Section 26 05 29–Supporting Devices. Support material shall match that of the conduit type being provided.

2.03 LIQUIDTIGHT FLEXIBLE CONDUIT AND FITTINGS

A. Liquidtight Flexible Metal Conduit:
   1. Conduit: Spiral-wound, electrogalvanized, single-strip steel with integral grounding conductor continuously enclosed within the entire length of the convolutions. The flexible PVC jacket shall be sunlight-resistant, flame-retardant, and resistant to damage from mild acids. Conduit shall be UL Listed and be rated for installation in Class I, Division 2, Groups C and D locations. Conduit shall be Liquatite Type LA, or equal.
   2. Fittings: UL listed with thermoplastic elastomer sealing gasket.
      a. Provide stainless-steel fittings outdoors and in NEMA 4X locations, unless noted otherwise.
      b. Provide electro-zinc plated steel fittings in all other areas, unless noted otherwise.

2.04 FLEXIBLE CONDUIT COUPLINGS (HAZARDOUS LOCATIONS)

A. Flexible conduit in hazardous locations shall be liquidtight, stainless steel and be rated for use in Class I locations. Outer braid and end fittings shall be stainless steel with flexible brass inner core. An insulated ground conductor shall be installed in all couplings.

B. Couplings shall be as manufactured by Crouse Hinds EC Series, or Appleton EX Series.

2.05 CONDUIT SEALS AND SPECIAL FITTINGS

A. Conduit seal-offs for Class I Locations: Robroy Industries Plasti-Bond Red H_2OT Series EYS seal fittings and Crouse Hinds "Chico A" sealing compound, Arrow-Hart, or equal.

B. Conduit Seals: Duct sealing compound, OZ Gedney Type DUX, or equal.

C. Expansion Fittings: Crouse Hinds or Robroy type XJG, or equal, for rigid, IMC, or PVC-coated rigid conduit. Crouse Hinds, type XD, or equal for PVC conduit.

D. Expansion Deflection Fittings: O-Z type "DX," Crouse Hinds, type XD (PVC conduit only), or Appleton.

E. Ground Bushings: Crouse Hinds Model GLL, or equal.

F. Mechanical Seals: 316 stainless steel, Link Seal, or equal. Link seals shall be provided with 316 stainless steel bolts, nuts, and fasteners.

G. Watertight Hubs: Diecast, insulated and gasketed, rated for wet or dry locations indoors or outdoors. Watertight hubs shall be Appleton HUBXXXDN, Crouse-Hinds Myers Hubs, or equal.

H. Conduit Plugs: Kwik N Sure pipe plug as manufactured by Cherne Industries, or equal. Plug shall include natural rubber O-ring with galvanized wing nut and hex nut.

PART 3–EXECUTION

3.01 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

A. Size conduits for branch circuit conductors, control wires, and instrumentation cables so as to have not less than 25% spare capacity after installation; 3/4 inch minimum size. Minimum size for liquidtight flexible metal conduit is 1/2 inch.

B. Maintain at least 1 inch of separation between conduit sizes to 1 1/2 inches and 2 inches between conduits 1 1/2 inches or larger. Maintain 1 foot of separation between signal conduits (below 100 volts) and power conduits (100 volts and above).

C. All conduit shall be supported in accordance with the NEC and as specified herein. This shall apply to all conduit types, including flexible conduit.

D. Provide for the proper application, installation, and location of inserts, supports, and anchor bolts for a satisfactory raceway system. Where any component of the raceway system is damaged, replace or provide new raceway system.

E. Run conduits concealed to avoid adverse conditions such as heat and moisture, to permit drainage, and to avoid all materials and equipment of other trades. Maintain a minimum clearance of 6 inches from all hot water pipes, flues, or any high-temperature piping or ductwork.

F. Conduits shall be attached to building surfaces and not suspended unless installed in a Unistrut-type conduit rack as specified herein. Individual conduits shall not be suspended. Clevis hangers are not allowed.

G. Center conduit in structural slabs (other than topping), clear of reinforcing steel and spaced on centers equal to or exceeding three times the conduit diameter. Outside diameter of conduit shall not exceed one-third the slab thickness for each run of conduit 1 1/4 inches or larger. Provide shop drawings when it will be installed in structural slabs. Conduits shall not be run in slabs-on-grade or structural topping slabs.

H. Independently support or attach the raceway system to structural parts of construction in accordance with good industry practice.

I. Conduit attached to building surfaces that may be damp shall be spaced out to avoid rust and/or corrosion using fittings approved for the use. Use back straps on all conduit in damp or wet locations, or mount conduit with Unistrut straps, or equal. Watertight hubs shall be used in all damp locations. Damp locations shall include, but not be limited to, all basement areas, tunnel areas, washdown areas, garage areas, all wet wells and dry wells, all areas below grade, and exterior locations.

J. Conduits shall be securely fastened to building structure at intervals not exceeding 8 feet or closer, if necessary. Where hangers are necessary, 3/8-inch rod/eyelets/rings/or trapeze type in Unistrut channel and pipe clamps shall be used. Wire or perforated strap iron is not acceptable. PVC conduit shall be securely fastened to building structure at intervals not exceeding 3 feet.

K. Vertical conduit runs 1 1/4 inches and larger passing through floors shall be supported at each floor with conduit riser grips.

3.02 GENERAL CONDUIT INSTALLATION REQUIREMENTS

A. Interior conduit shall be run concealed in walls, building cavities, chases, attic spaces, and buried below floor slabs. Exterior conduit shall be buried below grade and concealed in structure walls. Exposed conduit runs shall be avoided. Conduit may be run exposed only where it is impossible to conceal.

B. Conduit may be run exposed on the underside of precast or poured concrete floor slabs or in basements. Run exposed conduit grouped and parallel or perpendicular to construction. Do not route exposed conduits over boilers or other high-temperature machinery nor in contact with such equipment. All conduit shall be run exposed in structures below grade.

C. All conduit installed below grade shall be buried a minimum of 2 feet 0 inches. All conduit installed below floor slabs shall be buried a minimum of 1 foot below slab.

D. PVC conduit installed in earth (interior and exterior) shall be bedded in compacted sand with a minimum of 6-inch cover on all sides.

E. In all PVC conduit runs below grade 200 feet and longer, PVC coated rigid steel conduit shall be used for all 90 degree bends.

F. Ream conduit smooth at ends, cap upon installation, rigidly attach to structural parts of the building, and securely fasten to all outlet boxes, panel cabinets, junction boxes, pull boxes, splicing chambers, safety switches, and all other components of the raceway system.

G. Conduits installed for future equipment or electrical work shall be cut off and capped flush with finished floor. Conduit ends shall have threaded fittings to accommodate future conduit installation.

H. Provide conduit raceway for exposed cables that are not UV resistant. This shall include, but not be limited to, instrument wiring, motor terminators, pump cables, float cables, etc.

I. Conduit seals shall be provided for intrinsically safe circuits, where conduits pass from the interior to exterior of the building, where conduits enter a room which at any time is a low or high temperature room, where conduits enter a room which at any time is subject to internal air pressures above or below normal, any conduit entering a wet location, and any conduit entering a NEMA 4X area.

J. Liquidtight flexible conduit shall be installed in such a manner that liquids tend to run off the surfaces and not drain toward the fittings.

K. All runs of flexible conduit and flexible conduit couplings to equipment and devices shall be as short as practicable, of the same size as the conduit it extends, and with enough slack to reduce the effects of vibration to a minimum. A minimum of 18 inches of flexible conduit shall be installed for each motor.

L. Provide conduit expansion-deflection fittings as specified herein in all conduit runs where movement perpendicular to axis of conduit may be encountered.

M. Conduits shall be pitched so that drainage is towards handholes and away from all structures.

N. Conduit bends for PVC conduit shall be made using a hot box, heat blanket, or glycol bender. Open flame or point heat sources of any type are not allowed.

O. The PVC-coated rigid conduit manufacturer's touch-up compound shall be used on all conduit interior and exterior bare steel exposed because of nicks, cuts, abrasions, thread cutting, and reaming; minimum six coats.

P. Where below-grade PVC conduit is connected to rigid metal conduit, the length of PVC conduit shall be a minimum of 10 feet. For short, below-grade conduit runs where required lengths of rigid metal conduit limit the length of PVC conduit to less than 10 feet, rigid metal conduit shall be used for the entire run.

3.03 CONDUIT PENETRATIONS AND TERMINATIONS

A. Where fittings are brought into an enclosure with a knockout, a gasket assembly consisting of an O-ring and retainer shall be installed on the outside. Fittings shall be insulated throat type.

B. Conduit penetrations for control panels or enclosures containing electronic equipment shall utilize watertight hubs and enter the sides or bottom of the enclosure. Conduits shall not penetrate the top of the enclosure.

C. Conduit penetrations for all exterior enclosures (e.g., disconnects, junction boxes, control panels) shall utilize watertight hubs and enter the sides or bottom of the enclosure. Conduits shall not penetrate the top of the enclosure.

D. Provide firestopping for all conduits penetrating fire barriers as specified in Section 07 84 00–Firestopping.

E. All conduits that protrude from poured concrete shall be PVC-coated rigid conduit. Conduit shall extend continuously (i.e., no joints) a minimum of 4 feet beyond the poured concrete (both sides).

F. Conduits passing through masonry, concrete, or similar construction shall be cast in place using PVC-coated rigid conduit extending completely through the construction.

G. Where above-grade conduits pass through cores in existing structures or through masonry walls, grout openings between conduit and walls or floors with sand cement mortar.

H. Where wall penetrations through existing walls are below grade, cored openings shall be sealed with waterproof mechanical seals. Cores shall be pitched slightly such that conduit slopes away from building. Sleeve diameter shall be provided and mechanical seals installed as recommended by the manufacturer. Conduit shall extend continuously (i.e., no joints) a minimum of 4 feet beyond the wall (exterior).

I. All spare conduits that terminate in a building or structure below grade shall be plugged with conduit plugs as specified herein.

3.04 CONDUIT INSTALLATION IN HAZARDOUS LOCATIONS

A. All conduits installed in or passing through "hazardous locations" as defined by the NEC, NFPA, or as noted on the drawings, shall be installed with seal-offs as specified herein.

B. All conduits in hazardous locations shall be installed in accordance with the NEC.

C. Conduits for intrinsically-safe circuits shall be dedicated to intrinsically-safe wiring. Conduits shall be installed and identified by labeling or color coding in accordance with Article 504 of the NEC.

3.05 CONDUIT INSTALLATION FOR EMERGENCY LIGHTING AND POWER CIRCUITS

A. All emergency egress lighting and power circuits shall be installed in dedicated conduits.

B. Conduits for emergency egress lighting and power circuits shall be installed and permanently marked in accordance with the NEC.

3.06 CONDUIT INSTALLATION SCHEDULE

A. The following schedule lists specific conduit types allowed in designated areas. Those areas not listed under a specific conduit type shall not have that type of conduit installed:

1. Rigid steel:
   a. Structural slabs.
   b. Interior locations requiring mechanical protection.
   c. All exposed interior locations.
   d. All concealed interior locations.
   e. Class I, Division 2 locations.
2. Rigid aluminum:
   a. All exposed interior locations.
   b. Interior locations requiring mechanical protection.
   c. Exterior locations (except in earth and at Chlorine contact tanks) and locations exposed to weather.
   d. Class I, Division 2 locations.
   e. All locations where attached to aluminum railings or aluminum structural members.
   f. Where noted on the drawings.
3. PVC-coated rigid steel:
   a. Class I, Division 1 locations.
   b. Conduits protruding from concrete.
   c. Interior and exterior locations requiring mechanical protection.
   d. Earth.
   e. Exterior locations and locations exposed to weather.
   f. Within 6 feet of building or structure footing, wall, or manhole/handhole.
   g. Conduits within manholes.
4. PVC:
   a. Earth, except within 6 feet of a building or structure footing, wall, or manhole/handhole. PVC conduit under pavement or roadways shall be Schedule 80.
   b. NEMA 4X areas (indoors only).
   c. Service entrance ground conductors.
   d. Buried below slabs on grade.
   e. Concrete encased duct banks (Schedule 40 or Schedule 80).
5. Liquidtight flexible metal conduit not over 3 feet in length for final connections to:
   a. Equipment in wet locations.
   b. Equipment with sliding bases or flexible positioning.
   c. Equipment with vibration isolation mounting.
   d. Equipment housing ferromagnetic cores or with integral moving components capable of generating noise or vibrations, including transformers and motors.
   e. All pumps and associated equipment.

END OF SECTION

SECTION 26 05 35

BOXES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Switch, outlet, and small junction boxes.
   2. Pull and junction boxes.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern Work in this section.

1.02 REFERENCES

A. ANSI/NEMA OS 1–Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

B. ANSI/NEMA OS 2–Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.

C. NEMA 250–Enclosures for Electrical Equipment (1000 Volts Maximum).

1.03 QUALITY ASSURANCE

A. Manufacturers of switches, outlets, boxes, lamps, fuses, lugs, etc.: Firms regularly engaged in the manufacture of these products, of the types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation Work similar to that in this project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.

D. UL Labels: Provide electrical cable, boxes, raceways, wire, connectors, outlets, switches, etc., which have been listed and labeled by Underwriters Laboratories.

E. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

PART 2–PRODUCTS

2.01 SWITCH, OUTLET, AND SMALL JUNCTION BOXES

A. Masonry and Partition Boxes: Galvanized steel, nongangable. Thomas & Betts, GW Series, or equal. Provide number of gangs for devices shown on the drawings.

B. Cast Boxes: Aluminum or cast feraloy, deep-type, gasketed cover, threaded hubs, Crouse-Hinds FD Series, or equal.

C. PVC-Coated Cast Boxes: Boxes shall be by the same manufacturer as the conduit.

D. NEMA 4X Boxes: PVC or FRP, Carlon NS Series, or equal, with proper cover and gasket. 316 stainless steel, Saginaw Control and Engineering SCE Series, or equal, where specified herein.

E. Covers for switch and outlet boxes used as junction boxes shall have covers that match box type.

2.02 PULL AND JUNCTION BOXES

A. Cast Boxes: NEMA 250; Type 4, flat-flanged, surface-mounted junction box, UL-listed as watertight. Cast aluminum or feraloy box and cover with ground flange, neoprene gasket, and stainless steel cover screws, Crouse-Hinds WCB Series, or equal.

B. PVC-Coated Cast Boxes: Provide PVC-coated cast boxes in areas where PVC-coated conduit is used. Boxes shall be by the same manufacturer as the conduit.

C. NEMA 4X Boxes: PVC or FRP, Carlon HS Series, or equal with proper cover and gasket. 316 stainless steel, Saginaw Control and Engineering SCE Series, or equal, where specified herein.

D. Boxes specified in this section are not allowed to have knockouts and are not allowed to be used as enclosures for control panels.

PART 3–EXECUTION

3.01 COORDINATION OF BOX LOCATIONS

A. Provide electrical boxes as shown on the drawings and as necessary for splices, taps, wire pulling, cable bending radii, equipment connections, and code compliance.

B. Electrical box locations shown on the drawings are approximate. Verify location and size of floor boxes and outlet boxes in all work areas prior to rough-in.

C. Where dedicated raceways are provided for different voltage systems or wiring, (e.g., motor power wiring and motor space heaters), separate boxes shall also be provided unless acceptable to ENGINEER. Where acceptable to ENGINEER, combined boxes shall be physically divided to separate the wiring.

D. Locate and install boxes to allow access. Where installation is inaccessible, coordinate locations and sizes of access doors.

E. Locate and install to maintain headroom and to present a neat appearance.

F. All boxes attached to building surfaces that may be damp shall be spaced to avoid rust and/or corrosion. All boxes in damp locations shall be on 1/2-inch standoffs. Damp locations shall include, but not be limited to, all basement areas, tunnel areas, exterior locations, garage areas, all wet wells and dry wells, all areas below grade, and any washdown areas.

3.02 SWITCH, OUTLET, AND SMALL JUNCTION BOX INSTALLATION

A. Provide knockout closures for unused openings.

B. Support boxes independently of conduit.

C. Use multiple gang boxes where more than one device is mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.

D. Install boxes in walls without damaging wall insulation.

E. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

F. Switch and outlet boxes provided for branch circuits and feeders shall not contain control wiring. Control wiring, wiring for emergency egress lighting, and intrinsically safe wiring shall each have dedicated pull and junction boxes provided. Wiring for different voltage systems (e.g., 24 V, 120 V, 480 V) shall have dedicated pull and junction boxes for each voltage.

G. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.

H. For weatherproof switches, devices, and exterior fixtures, use cast boxes with proper cover and gasket.

I. All exterior outlet boxes shall be NEMA 4X.

J. All interior exposed wall and ceiling outlet boxes shall be cast boxes, unless otherwise noted.

K. Knockout punches or saws shall be used for holes; boxes with prepunched holes are not acceptable.

L. Boxes shall be of a depth to accommodate wires and splices and shall be equipped with both fixture hanging studs and tapped fixture ears. Boxes shall be installed so that they will support the weight of the fixture. Conduit will not be considered as adequate supports.

M. Cast boxes with 3/4-inch hubs and aluminum fittings and enclosures may be used with all conduit types.

N. Provide PVC-coated cast boxes in all areas where PVC-coated conduit is used. Boxes in hazardous locations shall be rated for Class I, Division 1, Groups C and D locations. Boxes shall be by the same manufacturer as the PVC-coated conduit.

3.03 PULL AND JUNCTION BOX INSTALLATION

A. Locate pull boxes and junction boxes in unfinished areas.

B. Support pull and junction boxes independent of conduit.

C. Knockout punches or saws shall be used for holes; boxes with prepunched holes are not acceptable.

D. Refer to Section 26 05 53–Electrical Identification for junction box labeling requirements.

E. All interior exposed junction and pull boxes shall be cast type with cover, unless noted otherwise.

F. All exterior junction and pull boxes shall be NEMA 4X. Boxes in areas subject to damage shall be stainless steel.

G. Boxes in hazardous locations shall be rated for Class I, Division 1, Groups C and D locations. Boxes shall be by the same manufacturer as the PVC-coated conduit.

END OF SECTION

SECTION 26 05 44

HANDHOLES

PART 1–GENERAL

1.01 DESCRIPTION

A. Work Included: Precast polymer concrete handholes.

B. Related Sections: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. ASTM A48–Specification for Gray Iron Castings.

B. ASTM A615–Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

C. ASTM C478–Specification for Precast Reinforced Concrete Manhole Sections.

D. ASTM D4101–Specification for Polypropylene Injection and Extrusion Materials.

E. ANSI A14.3–Safety Requirements for Fixed Ladders.

F. ANSI/SCTE 77–Specification for Underground Enclosure Integrity.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

B. Shop drawing submittals shall include the following:
   1. Interior elevations of each wall of all manholes and handholes provided under this Contract. Each conduit shall be identified as to what it serves.
   2. Product data (Handholes): Manufacturer's technical information for handholes and accessories proposed for use.

PART 2–PRODUCTS

2.01 PRECAST POLYMER CONCRETE HANDHOLES

A. Material and Construction:
   1. Precast polymer concrete.
   2. Duct entrances sized and located to suit duct banks.
   3. Enclosures, boxes and covers are required to conform to test provisions of ANSI/SCTE 77 for Tier 22 applications.
   4. Handholes shall be a minimum of 30 inches deep. Handholes shall be sized in accordance with the NEC.

5. All covers are required to have a minimum coefficient of friction of 0.50 in accordance with ASTM C1028.
6. Covers shall have the following stamped logo:

   "ELECTRICAL"

7. Handholes shall be Hubbel, Quazite, PG-Style, or equal.

PART 3–EXECUTION

3.01 INSPECTION AND COORDINATION

A. Examine conditions under which the Work is to be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

B. Coordinate manhole and handhole installation with piping, sheeting, and other underground systems and structures, and locate clear of interferences.

3.02 INSTALLATION

A. Install handholes where shown and verify locations in field. Perform excavation and backfilling required for installation. Excavation and backfilling shall be in accordance with Section 26 05 00–General Electrical Requirements.

B. Install handholes on a 3/4-inch crushed stone foundation 1 foot under all manholes handholes, and within 2 feet of exterior of handholes. Handhole bases shall be set at the proper grade and carefully leveled and aligned.

C. Metal Pull Box: Install NEMA 4X stainless steel wall-mounted pull box inside handholes where fiber optic and low voltage (<100 volts) signal cables are mixed with power cables. Route conduits for fiber optic and analog cables directly into and out of metal pull box so that no fiber optic and analog cables are exposed within the handhole. Size pull box so that the fiber-optic cable manufacturer's recommended bend radius and pulling tensions are not exceeded.

D. All conduits must enter the sides of handholes. Conduits entering the bottom will not be permitted. Conduits shall enter manholes a minimum of 18 inches above bottom of manhole. Conduits shall enter handholes a minimum of 6 inches above bottom of handhole. Provide manhole/handhole depth as required. Conduit burial depth shall be 24 inches as specified.

E. Handholes shall be considered wet locations for purposes of equipment selection.

F. All conduits shall be pitched so that drainage is towards handholes and away from all structures.

3.03 GRADING AT HANDHOLES

A. Handholes in unpaved areas shall be built as shown to a rim elevation higher than the original ground. The ground surface shall be graded to drain away from the handhole. Fill shall be placed around handholes to the level of the upper rim of the manhole handhole

frame, and the surface evenly graded on a one (vertical) to five (horizontal) slope to surrounding ground, unless otherwise shown.

B. CONTRACTOR shall be solely responsible for proper height of handholes necessary to reach final grade. ENGINEER's review of shop drawings for handhole components is general in nature, and CONTRACTOR shall provide random length precast handhole riser sections to adjust handholes to meet field conditions for final grading.

END OF SECTION

SECTION 26 09 00

CONTROLS AND INSTRUMENTATION

PART 1–GENERAL

1.01 SUMMARY

A. Allowances: System Supplier shall include in the Bid the cost of the following items specified in this section. Refer to the individual sections listed below for a complete description of the work required. SCADA Systems Integrator Allowances, Item 2.01 SCADA System Modifications.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

PART 1–GENERAL 1
1.01 SUMMARY 1
1.02 SYSTEM DESCRIPTION 1
1.03 QUALITY ASSURANCE 1
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1.05 OPERATION AND MAINTENANCE DATA 2
1.06 DELIVERY, STORAGE, AND HOLDING 2
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1.08 WARRANTY 3
PART 2–PRODUCTS 3
2.01 RADAR LEVEL TRANSMITTER 3
PART 3-EXECUTION 3

1.02 SYSTEM DESCRIPTION

A. The work includes furnishing, delivering, installing all items furnished, and placing in operation controls and instrumentation, and Supervisory Control and Data Acquisition (SCADA) modifications for the West Hickman WWTP Scum.

B. CONTRACTOR shall inspect all work. The Bid shall include everything necessary to obtain a complete installation operating in accordance with these specifications and the Bidder's proposal, whether necessary items and equipment are contained in, or are remote from the enclosures furnished under this Contract. All responsibility for this system ultimately lies with CONTRACTOR.

1.03 QUALITY ASSURANCE

A. System Suppliers: Firms regularly engaged in the design and manufacture of SCADA systems of the size and complexity specified herein, and whose systems have been in satisfactory use in similar service for not less than 10 years.

B. Installer: A firm with at least 10 years of successful installation experience on projects with SCADA System design and installation work similar to that required for the project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.

D. UL Labels: Provide control panels, power supplies, controllers, relays, wire, and connectors that have been listed and labeled by Underwriters Laboratories.

E. NECA Standards: Comply with applicable portions of National Electrical Contractor's Association's Standard of Installation.

1.04 SUBMITTALS

A. Manufacturer's Data: Submit manufacturer's data, specifications, and installation recommendations for each item specified herein.

B. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

C. Provide product data on all equipment and devices specified herein as well as wiring schematics for all systems.

1.05 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provision of Section 01 33 00–Submittals.

B. Include spare parts data listing, source and current prices of replacement parts and supplies, and recommended maintenance procedures and intervals.

C. Submit Operation and Maintenance Manuals in accordance with Division 01.

1.06 DELIVERY, STORAGE, AND HOLDING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish.

1.07 DESCRIPTION OF THE WEST HICKMAN WWTP SCADA SYSTEM

A. The West Hickman Wastewater Treatment Plant is monitored and controlled through a SCADA system utilizing Allen-Bradley PLCs and Citect HMI.

B. Plant operation and alarms are monitored and displayed graphically in the Administration Building computer room. Communication from PLCs to the computer room is through a fiber-optic network.

C. The SCADA system is provided with a SQL Server Historical Database, "Bigfoot" computerized maintenance system (CMMS) and interface with Hach WIMS information management system.

D. Shop drawings of the existing control system will be made available to the successful Bidder for development of the required loop drawings, interface requirements, and wiring requirements.

1.08 WARRANTY

A. Standard One-Year Warranty: Manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year in accordance with GC12.6.

PART 2–PRODUCTS

2.01 RADAR LEVEL TRANSMITTER

A. Radar level transmitters shall utilize radar, noncontacting method to measure level with accuracy of ±0.08 inches. A four-digit local display shall allow operator-selected display of level, and level shall be field-programmed for units of feet, inches, etc. Output shall be 4-20 mAdc into 350-ohm load and a pulse output.

B. The indicating transmitters shall be housed in a NEMA 4 enclosure, remote from the radartransducer.

C. Transducers in Class I locations shall be FM approved as being suitable for Class I, Division 1, Groups A, B, C, and D locations and shall have an operating range of -40°F to 200°F.

D. The interconnecting cable between transducer and the amplifier shall be provided with the instrument, and be run in a conduit separate from other wires or cables. Provide a 120 Vac power source for the transmitter.

E. The radar level transmitters shall be Vega, Vegapuls 61.

PART 3-EXECUTION

NOT APPLICABLE

END SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Wall switches.
   2. Receptacles.
   3. Cover plates.
   4. Control stations.
   5. Thermostats.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. NEMA WD 1–General-Color Requirements for Wiring Devices.

B. NEMA WD 5–Specific-Purpose Wiring Devices.

C. Drawings–Bill of Materials.

1.03 QUALITY ASSURANCE

A. Manufacturers of switches, outlets, boxes, lamps, fuses, lugs, etc.: Firms regularly engaged in the manufacture of these products, of the types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.

D. UL Labels: Provide electrical cable, raceways, wire, connectors, outlets, switches, etc., which have been listed and labeled by Underwriters Laboratories.

E. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

B. Provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

PART 2–PRODUCTS

2.01 WALL SWITCHES

A. A-C general use Industrial specification grade, snap switch, 20 amperes, 277 volts, one of the following: Cooper 222*, Leviton 122*, or Pass and Seymour PS20AC*.

B. Class I Switches: AC general use snap switch, 20 amperes, Crouse-Hinds EDS, or equal.

C. Provide ivory-colored handles.

D. Manual motor switches or manual motor controllers for 120 V or 240 V motors on circuits 20 amps or less shall be specification grade snap switch as specified above. Manual motor switches or manual motor controllers for 120 V or 240 V motors on circuits 30 amps or less shall be Cooper 303*, Leviton 303*, or Pass and Seymour PS30AC*. Manual motor switches for three-phase motors 30 amps or less shall be as specified in Section 26 28 16–Disconnect Switches.

*Complete catalog number for pole arrangement necessary.

2.02 RECEPTACLES

A. Twenty ampere, 125-volt, NEMA 5-20R, Industrial specification grade, straight blade, 3-wire duplex grounded outlets, one of the following: Cooper 5362, Leviton 5362, Pass and Seymour 5362. 208-volt receptacles shall be grounded type, rated same as circuit indicated on the drawings. Provide ivory color.

B. GFCI Receptacle: GFCI receptacles shall be UL 943 listed, Pass and Seymour 2097, Cooper TRVGF20 receptacle with integral ground fault current interrupter. Provide ivory color.

C. Class I Receptacles: Crouse Hinds CPS-152 or Appleton CPS. Provide two plugs (total) to match receptacle.

2.03 COVER PLATES

A. Each and every flush box shall be provided with standard 302 series stainless steel plates, blank, receptacle, switch, or cord as designated by outlet symbol. Surface boxes shall have plates to match Crouse-Hinds, Appleton, or equal, cast boxes.

B. Thermoplastic ivory cover plates shall be used in all "finished" areas.

C. NEMA 4X and weatherproof switch covers shall be Thomas and Betts, Industrial Gray, toggle switch cover, Model E98TSCN-CAR, or equal.

D. While in use, receptacle covers for exterior use shall be Leviton M5979, or equal. Receptacle covers for NEMA 4X locations shall be Leviton 5980, or equal.

E. Cover plates for manual motor switches, manual motor controllers, and NEC required equipment disconnects shall have provisions for locking the switch in the On or Off position.

2.04 CONTROL STATIONS

A. Heavy-duty, oil-tight, 30 mm operators in NEMA 4X enclosures, unless otherwise noted. Control stations shall be Square D, Class 9001, Type SKY, Allen-Bradley Bulletin 800T, or equal, with operators as shown on the drawings. Lockouts where called for on the drawings shall be Square D, Type K5, or equal. Lights shall be LED type.

2.05 THERMOSTATS

A. Line voltage thermostats for single-stage heating or single-stage cooling, and for high- and low-temperature alarms shall be PECO Model TF115-001, or equal. Thermostats shall be rated NEMA 4X with a 40°F to 110°F temperature range and fixed 3°F deadband.

B. Line voltage thermostats for single-stage heating or single-stage cooling in Class I locations shall be Honeywell T6051B.

C. Thermostats shown on the drawings shall be single-stage unless otherwise noted.

PART 3–EXECUTION

3.01 INSTALLATION

A. All receptacles shall be mounted vertically.

B. GFCI receptacles shall not be series wired.

C. Install wall switches 48 inches above floor (top of box), "Off" position down, except as otherwise noted.

D. Install convenience receptacles 15 inches above floor (bottom of box), grounding pole on bottom except as otherwise noted.

E. Install specific-use receptacles above furniture, countertops, or at heights shown on the Drawings.

F. Install thermostats 48 inches above floor (top of box).

G. Convenience Receptacles: Specification grade self-grounding.

H. Install devices and cover plates flush and level.

I. Back wiring is not allowed for switches and receptacles. Wires shall be terminated with the device screw terminal.

J. Individual labels shall be placed on the back of all switch faceplates and receptacle faceplates indicating the lighting panel and circuit from which the switch or receptacle is fed. Labels shall be White background with Black lettering no smaller than 12-point font. Provide permanently attached self-adhesive type, machine fed, and self-laminating labels, or equal. All labels must be by the same manufacturer, same size, and same font. Handwritten labels are not acceptable.

END OF SECTION

SECTION 26 28 00

OVERCURRENT PROTECTIVE DEVICES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Provide overcurrent protective devices as shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

A. Submit shop Drawings and product data in accordance with provisions of Section 01 33 00–Submittals, including electrical ratings, physical size, interrupt ratings, trip curves, I^2t curves, and manufacturer's detailed specifications.

1.03 QUALITY ASSURANCE

A. Comply with the following requirements:
   1. NFPA 70 National Electrical Code (NEC).
   2. Local codes and ordinances.
   3. Provide overcurrent protective devices by same manufacturer for each type of device.

1.04 SPARE PARTS

A. Provide the following spare parts to OWNER that match items specified:
   1. In three-phase circuits: Three fuses of each type and rating.
   2. In single-phase circuits: Two fuses of each type and rating.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with pertinent provisions of Section 01 60 00–Materials and Equipment.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

PART 2–PRODUCTS

2.01 FUSES

A. General purpose fuses for protection of motors, transformers, feeders, and main service:
   1. Use UL Class RK-1 fuses:
      a. Single end rejection or to fit mountings specified.
      b. 0 to 600 ampere rating.
      c. 200,000 ampere interrupting capacity.
      d. Dual element, time delay.

e. Use Bussman Low Peak LPN-RK, or equal: 250-volt rating.
f. Use Bussman Low Peak LPS-RK, or equal: 600-volt rating.

2. Use UL Class L fuses:
   a. Bolt-in type.
   b. 601 to 6,000 ampere rating.
   c. 200,000 ampere interrupting capacity.
   d. Time delay.
   e. Use Bussman HI-CAP, KRP-C, or equal: 600-volt rating.
   f. All fuses shall be provided with indicating-type fuse blocks.

B. General purpose fuses for protection of motor control circuits, lighting ballasts, control transformers, and street lighting fixtures:
   1. Use UL Class CC, fast-acting, single-element fuses.
   2. Rated for 0 to 30 amperes.
   3. Provide 200,000 ampere interrupting capacity.
   4. Use Bussman Limitron KTK-R, or equal: 600-volt rating.

C. All lugs shall be rated to accept copper conductors.

2.02 CIRCUIT BREAKERS

A. General:
   1. Comply with UL 489 and NEMA AB1 requirements.
   2. Provide thermal and magnetic protection unless noted otherwise.

B. Feeder Breakers: Circuit breakers shall have a short-circuit interrupting rating as indicated on the Drawings.

C. All lugs shall be rated to accept copper conductors.

2.03 ENCLOSURES

A. Circuit breakers shall be installed within switchgear, switchboard, MCC, panelboard, etc. as shown on the Drawings.

B. Provide fused switch or circuit breaker with enclosures where required as listed below, unless noted otherwise on the Drawings:
   1. Indoor: NEMA 12, steel.
   2. Outdoor, corrosive, or wet location: NEMA 4X, stainless steel.
   3. Hazardous locations: NEMA 7, cast iron.

PART 3–EXECUTION

3.01 INSTALLATION

A. Install overcurrent protective devices in accordance with manufacturer's recommendations.

3.02 ADJUSTMENT

A. Set and record adjustable settings on circuit breakers to provide selective coordination and proper operation.

END OF SECTION

SECTION 26 28 16

DISCONNECT SWITCHES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Disconnect switches.
   2. Fractional hp motor switches.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. NEMA KS 1–Enclosed Switches.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals.

B. Include outline drawings with dimensions and equipment ratings for voltage, capacity, horsepower, and short-circuit.

PART 2–PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Disconnect Switches: Square D Class 3110 or Cutler Hammer Type DH.

B. Manual Motor Switches: Square D Class 2510 Type K or Cutler Hammer B330.

C. Substitutions: Under provisions of the General Conditions.

2.02 DISCONNECT SWITCHES

A. Fusible Disconnect Switches: NEMA KS 1; heavy-duty; quick-make, quick-break, load interrupter enclosed knife switch with externally-operable handle interlocked to prevent opening front cover with switch in "On" position. A defeater shall be provided to bypass this interlock. Handle shall be lockable in "Off" position. Provide fuse clips designed to accommodate Class R fuses, and auxiliary contacts to remove control power associated with field devices or instruments interlocked with equipment served. Auxiliary contacts shall be by the disconnect manufacturer.

B. Nonfusible Disconnect Switches: NEMA KS 1; heavy-duty, quick-make, quick-break, load interrupter enclosed knife switch with externally-operable handle interlocked to prevent opening front cover with switch in "On" position. A defeater shall be provided to bypass this

interlock. Handle lockable in "Off" position. Provide auxiliary contacts to remove control power associated with field devices or instruments interlocked with equipment served. Auxiliary contacts shall be by the disconnect manufacturer.

C. Manual Motor Switches: Where noted on the drawings, manual motor switches shall be provided for three-phase motors with circuit rating of 30 amps, or less. Manual motor switches shall have toggle operator without overload protection or indicator light. Provide cover plate for all switches to meet the finish or classification of the space. Cover plate shall have provisions for locking the switch in the "On" or "Off" position.

2.03 SINGLE-PHASE MOTOR SWITCHES (2 HP OR LESS)

A. Where noted on the drawings, motors rated 2 hp or less, for operation on 120 V or 240 V, single-phase, shall be provided with a specification-grade wall switch as disconnecting means. See Section 26 27 26–Wiring Devices for additional information.

2.04 ENCLOSURES

A. Provide disconnect switch enclosures as listed below, unless noted otherwise on the drawings:
1. Indoor dry locations: NEMA 12, steel.
2. Outdoor, corrosive, or wet locations: NEMA 4X, stainless steel.
3. Hazardous locations: NEMA 7, cast aluminum.

B. Provide manual motor switch enclosures as listed below, unless noted otherwise on the Drawings.
1. Indoor dry, outdoor, or wet locations: NEMA 4, die cast zinc.
2. Hazardous locations: NEMA 7, cast aluminum.

PART 3–EXECUTION

3.01 INSTALLATION

A. Provide disconnect switches where indicated on the drawings. Maximum mounting height shall be 42 inches above finished floor unless noted otherwise, or acceptable to ENGINEER based on field conditions.

B. Provide fuses in fusible disconnect switches where necessary and in accordance with Section 26 28 00–Overcurrent Protective Devices.

C. Provide wall switch for each single-phase fractional horsepower motor where indicated on the drawings.

D. Disconnect enclosures that house wiring powered from a source separate from the motor power wiring (e.g., MAS units, space heaters) shall have a nameplate installed on the front of the disconnect indicating that power may be present at the motor when the disconnect is in the "Off" position.

E. Wiring within disconnects shall only be for loads or equipment served by that disconnect. Foreign wiring within disconnect enclosures is not allowed. All wiring within disconnect enclosures shall be landed on lugs or terminals provided by the disconnect manufacturer, or

on dedicated terminal strips for instrumentation equipment or field devices. Splices and spring wire connectors are not allowed within disconnect enclosures.

F. Manual motor switches shall not be installed in corrosive and NEMA 4X locations. Provide disconnect switches.

END OF SECTION

SECTION 26 51 13

LIGHTING

PART 1–GENERAL

1.01 SUMMARY

A. Work includes a complete functional lighting system.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. Underwriters Laboratories: Lighting fixtures shall be manufactured in accordance with the standards of the Underwriters Testing Laboratories and shall bear the UL label where practicable. In all cases the lighting fixtures shall be constructed with UL listed components.

B. Applicable Codes: Fixtures shall be made and installed in accordance with the current version of the National Electrical Code, the Uniform Building Code, the Federal Occupational Safety & Health Act, and other applicable regulations.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) as applicable to construction and installation of electrical equipment, cable, wire, and connectors.

D. NEMA/ANSI Compliance: Comply with National Electrical Manufacturers Association, American National Standards Institute, and other standards pertaining to material and construction and testing where applicable.

1.03 SYSTEM DESCRIPTION

A. Intent: It is the intent of these specifications to obtain a completed lighting fixture installation by CONTRACTOR. Completed means lamped, cleaned, adjusted, tested, and ready for occupancy and operation in accordance with the above-indexed paragraphs and in accordance with the other sections of these Contract Documents. It is the responsibility of CONTRACTOR to point out discrepancies, errors, and other problems.

B. All lighting fixtures are to be provided complete with all necessary accessories for a proper installation. Catalog numbers shown are basic fixture types, and additional features, accessories, and options specified, scheduled or required, are to be included for all fixtures provided.

C. Provide lamps for all fixtures of size and type as recommended by the fixture manufacturer and as scheduled.

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Section 01 33 00–Submittals. Shop drawings shall include, but not be limited to, the following:

1. Manufacturer's dimensioned scale drawings showing in complete detail the fabrication of all lighting fixtures including overall and detail dimensions, finishes, prefinishes, metal thickness, fabrication methods, support method, ballasts, sockets, type of shielding, reflectors, wiring sizes and insulation types, lenses, provisions for relamping, and all other information to show compliance with the Contract Documents. Manufacturers' catalog cut sheets will not be acceptable.
2. Installation instructions.
3. Certified test data and reports.
4. Shop drawings shall not only clearly indicate the assigned fixture type, but also the equipment location.
5. Provide a submittal on all lamp types used. Submittal should include, but not be limited to, lumen output, lamp color temperature, and CRI value.

B. Submit for review samples requested by ENGINEER. The fixtures or components are to be tagged with the project name and the fixture type. Samples will be held by CONTRACTOR available for reference throughout the construction period. Fixtures or components under the Contract shall be identical with the accepted samples. No sample (fixture or component) is to be installed on the Project.
   1. In the event the submissions are not approved, the materials will be returned to CONTRACTOR to immediately make a new submission responding to the notations (corrections/revisions) of ENGINEER regarding compliance with the Contract Documents.
   2. All charges for these shipments shall be paid by CONTRACTOR.
   3. The fixture schedule shows the style of the fixture only. CONTRACTOR shall verify the types of ceiling and mounting construction prior to releasing fixtures for fabrication and delivery, and provide fixtures adapted to the ceiling construction used.

1.05 QUALITY ASSURANCE

A. Standards: Materials, equipment, and parts, as well as workmanship provided under this section, shall conform to the highest commercial standard as specified and as indicated on drawings. Fixture parts and components not specifically identified or indicated shall use materials most appropriate to their intended use or function and as such be resistant to corrosion and thermal mechanical stresses encountered in the normal application and function of the fixtures.

B. Measuring and Testing Equipment: CONTRACTOR shall have available at all times, instruments for the measurement of voltage, luminaire temperature, lighting level, and fixture brightness level.

C. Photometric Testing: Samples may be necessary to be subjected to photometric testing at the request of ENGINEER. Luminaire efficiency shall be determined in an integrating sphere not less than 100 inches in diameter. Testing will be at CONTRACTOR's expense.

D. Manufacturers: Firms regularly engaged in the manufacture of lighting fixtures of the types and ratings for the project, whose products have been in satisfactory use in similar service for not less than 5 years.

E. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.

1.06 SPECIAL FIXTURES

A. Special Fixtures: Designs and/or unique applications of standard units may need samples and mock-ups and other developmental work which is to be specifically provided for in CONTRACTOR's Bid.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Luminaires and lighting equipment shall be delivered to the project complete, including mounting devices, lamps, and components necessary for the proper operation of the equipment.

B. Marking: All equipment must be clearly and boldly identified as to the fixture type and, where practicable, the fixture location.

C. Timely Purchasing: Luminaires and associated lamps and other appurtenances shall be ordered in a timely fashion and securely stored to be available to meet the project schedule.

1.08 WARRANTY

A. Standard One-Year Warranty: Manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year utilization in accordance with GC12.6.

PART 2–PRODUCTS

2.01 FABRICATION

A. Materials: Provide dimensional thickness of metal, plastic, and composite materials so that all fixtures are rigid, stable, and will resist deflection, twisting, and warping under normal installation and relamping procedures.

B. Joints: Provide positive, durable, means of connection at all joints. No hollow rivets shall be used.

C. Gaskets: Provide neoprene, silicone, rubber, or other appropriate gasketing, stops, and barriers where required, to prevent light leak, control sound and vibration, prevent water leaks, and if pertinent, water vapor penetration.

D. Edges: Provide finished product with the following minimum qualities:
   1. Ground and/or burr-free metal edges.
   2. Tight-fitting connections, hinges, and closures.
   3. Clean, neat corners, edges, trims, and frames.

E. Castings: All cast parts, including die-cast members, shall be of uniform quality; free from blow holes, pores, hard spots, shrinkage defects, cracks, or other imperfections that affect strength and appearance or are indicative of inferior metals or alloys.

2.02 FINISHES

A. Application: Fixture finishes shall be applied in a manner that will provide a durable wear-resistant surface:
   1. Prior to finishing, all surfaces must be free from foreign materials such as dirt, rust, oil, polishing compounds, and mold-release agents.
   2. All castings and extrusions shall be machined, sanded, or similarly treated and given minimum one coat of baked-on clear methacrylate lacquer, unless a painted finish is specified.
   3. Aluminum surfaces exposed to weather (other than anodized reflectors covered elsewhere) shall receive a duronodic or polyester powder paint finish as specified for corrosion resistance.
   4. Sheet steel fixture housings, iron and steel parts, which have not received phosphating treatment ("Bonderizing," or similar process) or are to be utilized in exterior applications, are to be made corrosion-resistant by zinc or cadmium plating or hot-dip galvanizing.
   5. Unless specified to the contrary, all fluorescent fixture housings shall have a complete coverage of white alkyd reflecting enamel, 85% minimum reflectivity, applied by either a spray or dip process, then baked in a temperature-controlled oven until paint is thoroughly cured. Prior to applying the enamel, each metallic surface shall be prepared for painting by using a five-stage hot zinc phosphatizing process.

2.03 LAMPS

A. Lamps: Provide new lamps as specified for all lighting fixtures (luminaires) as shown on the drawings.

B. Fluorescent Lamps:
   1. All fluorescent lamps shall be of the same manufacturer.
   2. All fluorescent lamps shall be 3500 K color temperature.
   3. Color Rendering Index (CRI).
      a. Compact fluorescent lamps shall have a minimum CRI rating of 82.
      b. Linear fluorescent lamps shall have a minimum CRI rating of 86.
   4. Lamps shall be of the wattage specified on the drawings.
   5. Initial lamp lumen output shall be as follows:

Lamp Type	Nominal Wattage	Minimum Initial Lamp Lumens
T8	32	3000
T5	28	2900
CFL	32	2200
CFL	42	3200

C. High Intensity Discharge (HID) Lamps:
   1. All HID lamps shall be of the same manufacturer.
   2. HID lamps shall have a minimum CRI rating of 65.
   3. ALL HID lamps shall be minimum 4000 K color temperature.
   4. Lamps shall be clear, base up or down burning to suit application.
   5. Initial lamp lumen output shall be as follows:

Lamp Type	Nominal Wattage	Minimum Initial Lamp Lumens
Pulse start-MH	70	4700
Pulse Start-MH	250	23000

D. Lamps shall be manufactured by Phillips, Sylvania Osram, or equal, wattage as indicated on the drawings.

E. LED Downlight Inserts:
1. All downlight LED lamps shall be of the same manufacturer.
2. All downlight LED lamps shall be 3500 K color temperature.
3. All downlight LED sources shall have a minimum CRI rating of 92.
4. All downlight LED lamps shall be of the wattage specified on the drawings.
5. Initial downlight LED source lumen output shall be minimum 650.

2.04 LAMP BALLASTS

A. Linear Fluorescent Electronic Ballast:
1. Fluorescent ballast: Shall meet UL Standard 935. Ballasts shall be PROGRAM RAPID START (PRS) type.
2. Ballasts shall meet applicable ANSI and IEEE standards regarding harmonic distortion and surge protection. The input current third harmonic content shall not exceed 13% of the input current. The total harmonic distortion shall not exceed 10%.
3. Fluorescent ballasts shall conform to the performance criteria listed below:

Ballast	Nominal Lamp Watts	Max. Input Watts (ANSI)	Ballast Factor
1-F32T8	32	28	0.88
2-F32T8	32	56	0.88
3-F32T8	32	84	0.88
1-F28T5	28	27	0.95
2–F28T5	28	54	0.95
All others			0.88

4. Luminaires designed as multilevel switching shall have a combination of 1, 2, or 3-lamp ballasts configured to allow switching of all inboard lamps as a group separate from outboard lamps in the room. Master/slave luminaire arrangement is acceptable. CONTRACTOR shall verify ballast configuration to achieve switching shown prior to submittal.
5. Ballasts shall be universal voltage. The ballast must maintain constant high output through the entire input voltage ranges of 120 volts to 277 volts.
6. Ballast Requirements:
a. Current crest factor shall be no greater than 1.7.
b. The operating ambient temperature range shall be 50°F to 105°F.
c. Fluorescent ballasts shall operate at 20 kHz or higher, with no detectable lamp flicker.
d. Four lamp ballasts shall operate parallel circuit lamps that allow remaining lamps to maintain full output if companion lamps fail.
e. Ballasts shall not be affected by lamp failure and shall yield normal lamp life.
f. Ballast power factor shall be greater than 95%.
g. Ballast shall be rated Class P, thermally protected and have a Class A sound rating, or better.
h. Ballast shall comply with EMI and RFI limits set by FCC (CFR 47 Part 18).
i. Ballasts shall carry a 3-year warranty including labor allowance.

j. Program rapid start ballasts shall heat the filament prior to applying the starting voltage to the lamp, then remove lamp cathode heat.
k. Cold weather ballast(s) must reliably start and operate lamps in ambient temperatures down to 0°F for the rated life of the lamps.
l. Ballasts shall be provided with disconnects. Disconnects shall disconnect all ballast wiring including Hot, Neutral, and Ground conductors. Disconnect shall be UL listed.

B. High Intensity Discharge Ballasts:
1. HID ballasts:
a. Comply with ANSI C82.4, C82.6 and C92.1.
b. High pressure sodium:
(1) High power factor constant wattage auto-transformer for lamps 150 watts and above.
(2) High power factor, high reactance auto-transformer for lamps less than 150 watts.
c. Metal halide pulse start: Super constant wattage auto-transformer with igniter and a maximum crest factor of 1.5.
d. The ballast design center shall not vary more than ±5% from rated lamp walls for nominal line voltage and nominal lamp voltage.
e. With a nominal voltage "reference" lamp, the wattage regulation spread shall not exceed 20% for ±5% line voltage variation for high reactance auto-transformer high power factor ballasts and 30% for ±10% line voltage variation for auto-regulating high power factor ballast.
f. Ballasts must reliably start and operate the lamp in ambient temperatures down to -20°F for the rated life of the lamp. The ballast primary current during starting for high reactance auto-transformer-type ballasts may exceed the normal operating current by a factor of 1.5 for 250 to 1000-watt lamps. Auto regulating-type ballasts shall not exceed normal operating current.
g. High reactance auto transformer high power factor ballasts shall be capable of sustaining lamp operation with a line voltage dip or sag of 20% for up to 4 seconds when operating a nominal voltage lamp with nominal line voltage applied to the ballast primary.
h. Auto-regulating high power-factor ballasts shall be capable of sustaining lamp operation with a line voltage dip or sag of 40% for up to 4 seconds when operating a nominal voltage lamp with nominal line voltage applied to the ballast primary.
i. For high reactance auto-transformer high power-factor ballasts, the current crest factor shall not exceed 1.6 for ±5% line voltage variation, including lamp starting, or from nominal lamp voltage through rated end of life lamp voltage.
j. For auto-regulating high power-factor ballasts, the current crest factor shall not exceed 1.8 for ±10% line voltage variation, including lamp starting or from nominal lamp voltage through rated end of life lamp voltage.
k. For high reactance auto-transformer high power factor ballasts, the line power factor of the lamp/ballast system shall not be below 90% for ±5% line voltage variation.
l. For auto-regulating high power-factor ballasts, the line power factor of the lamp/ballast system shall not be below 90% for ±10% line voltage variation.
m. LS-NC Rating: NEMA LE-2, equal to or less than ratings listed in Table C-1.
n. Ballasts shall have minimum 2-year warranty.

C. Acceptable Manufacturers: Ballasts made by the following manufacturers will be accepted:
1. General Electric.
2. Universal.
3. Advance.

4. Motorola/Osram.

2.05 MARKING OF FIXTURES

A. Voltage Identification: Fixtures designed for voltages other than 110- to 125-volt circuits shall be clearly marked.

B. Lamp Types: Fixtures equipped with ballasts, etc., for operation of rapid start lamps shall be plainly marked "Use Rapid Start Lamps Only." Similarly, fixtures equipped with ballasts, etc., for operation of instant start or other type lamps shall be plainly marked. Markings must be clear and shall be located to be readily visible to service personnel but invisible from normal viewing angles when lamps are in place.

PART 3–EXECUTION

3.01 INSTALLATION

A. Install fixtures, lamps, lenses, etc., after building is enclosed, weathertight, and environmental conditions are nominally the same as expected for the complete spaces. All lamps, glassware, reflectors, and refractors shall be clean and free of chips, cracks, and scratches.

B. Lamps installed for use as temporary lighting shall be replaced with new lamps.

C. All wall-mounted fixtures and all ceiling-mounted surface fixtures including exit lights, shall be fed through a fixture Stud/Hickey/Nipple assembly and with provisions to prevent fixture turning.

D. All fixtures shall be securely and adequately supported and installed. Recessed lighting fixtures in suspended ceilings or in plaster ceilings shall have channel and supports provided by CONTRACTOR as described in the finish section of these specifications. CONTRACTOR shall provide plaster frames.

E. Surface- or pendant-mounted fixtures shall be attached to and supported from structural part of the building in a manner acceptable to ENGINEER. Fixtures shall be supported by not less than two supports for each fixture. Where fixtures are to be suspended, they shall be mounted on steel channel with the channel supported directly to the structure by a minimum of 3/8-inch rod inside rigid conduit stems. Any fixture which has an individual fixture weight of greater than 25 pounds shall have safety cable installed, in addition to other support means. Cable shall be 3/16-inch airplane cable. All fittings and connectors shall be compression type. Cables must be secured to the building structure and to a point or points on the fixture.

F. Industrial-type fixtures in unfinished areas which are near obstructions such as ducts and pipes shall be suspended so that the bottom of the fixture is no higher than the bottom of the obstruction. All fixtures in each room should be located at the height of the lowest fixture, but not lower than 8 feet 0 inches A.F.F. Fixtures shall not be located until the locations of these obstructions are determined, and fixtures shall be accessible after installation of other equipment.

G. Recessed fixtures in suspended ceilings shall have final connections made up of a length of flexible conduit not in excess of 6 feet, with THHN conductors and green ground conductor.

H. Provide inscription for exit and area of rescue assistance signs to conform to codes.

I. Metal decking shall not be pierced for fixture support.

J. All wiring for dimming circuits shall have an individual neutral provided for each circuit.

K. All fixture whips shall be constructed of minimum No. 12 AWG conductors.

3.02 SUPPORTS

A. Mounting Frames: Provide mounting frames (plaster frames for example), as necessary, for installation and as called for under other sections. Frames are to be finished matte white baked enamel unless otherwise noted.

B. Mounting Accessories: Provide bars, angles, or other attachment devices for all recessed fixtures. Fixtures shall be securely attached so there is minimum possible movement up, down, or sideways. Fixtures shall be mounted to permit access to wiring. Fastening devices shall be of a positive, locking type, and shall not require the use of special tools to apply or remove. Tie wires shall not be used in place of fastening devices.

C. Fire Codes: Where necessary to meet Code requirements, enclosure housings shall be constructed to provide a 1-hour fire rating.

D. CONTRACTOR Responsibility: CONTRACTOR shall verify all ceiling conditions from the drawings and furnish appropriate mounting details for each lighting fixture.

E. Pendant Mounting: Provide pendant- or surface-mounted fixtures with required mounting devices and accessories, including hickeys, stud extensions, ball aligners, canopies, and stems. Coordinate locations of fixtures in mechanical areas. Provide mounting stems on pendant fixtures of the correct length to uniformly maintain the fixture heights shown on the drawings, or established in the field.

F. Adequate rigid, sturdy support shall be provided to prevent possibility of fixture falling. Surface and pendant fixtures must be supported with two supports per 4-foot section, except that continuous 8-foot chassis shall have three supports. All pendants must have swivel aligners located at the top ends; pendants shall be minimum 3/8-inch threaded rod inside 3/4-inch rigid steel conduit, unless specifically indicated otherwise on the drawings, painted on jobsite. Support surface-mounted fixtures from structural members other than ceiling tees by providing Unistrut members laid across main ceiling tees or by attachment directly to structure.

3.03 ADJUSTMENT

A. Focusing/Adjustment: After the installation of lighting fixtures is completed, fixtures so requiring (both interior and exterior units), shall be adjusted after dark under the observation of OWNER.

3.04 CLEANING

A. Installation Sequence: Lighting fixture mounting frames, plaster rings, etc., are required to be installed prior to the finishing assembly which shall not be installed until the Project is "broom clean." When the fixture location or construction cannot permit sequential installation, CONTRACTOR shall carefully protect all reflectors, lenses, flanges, and other visible surfaces.

B. Cleaning: Before final acceptance by OWNER, all protective (strippable) coatings, dust, finger marks, paint spots, and any other materials deleterious to the appearance or functioning of the lighting fixtures must be removed. Abrasive cleaners are not permitted.

3.05 FINAL INSPECTION

A. Upon completion of the installation, lighting equipment must be in first-class operating order and free from defects in condition and finish:
   1. At time of final inspection, all fixtures and equipment must be installed and lamped with new lamps, and be complete with all lenses, diffusers, reflectors, side panels, louvers, or other necessary components.
   2. Fixtures shall be completely clean and free from finger marks, dust, plaster, or paint spots.
   3. Any reflectors, lenses, diffusers, side panels, or other parts damaged prior to the final inspection, shall be replaced at no expense to OWNER.
   4. Housing shall be rigidly installed and adjusted to a neat flush fit with the ceiling.

END OF SECTION

SECTION 31 10 00

SITE CLEARING AND STRIPPING

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Removal of surface debris.
   2. Removal of paving, curbs, and sidewalks.
   3. Removal of trees, shrubs, and other plant life.
   4. Strip and stockpile topsoil.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

3.01 PREPARATION

A. CONTRACTOR shall identify existing plant life to remain and shall tag accordingly.

3.02 PROTECTION

A. CONTRACTOR shall protect from damage utilities and structures that are to remain.

B. CONTRACTOR shall protect trees, plant growth, and features designated to remain as final landscaping.

C. See Division 01 for protection of survey monumentation.

3.03 CLEARING AND GRUBBING

A. Clearing and grubbing shall consist of cutting and disposing of trees, brush, windfalls, logs, and other vegetation and the removing and disposing of roots, stumps, stubs, grubs, logs, and other timber from within the clearing limits as defined on the drawings designated to be removed on the drawings or in the specifications or fall within the excavation, embankment, or improved areas of the site.

B. All roots and stumps shall be removed to a depth of not less than 12 inches below the original ground surface in embankment areas. In cut areas, such material shall be removed to a depth of not less than 12 inches below the subgrade.

3.04 REMOVALS

A. CONTRACTOR shall remove from the site all trees, brush, and other vegetation, debris, and rocks which fall within the excavation and grading limits, as well as any paving, curb and gutter, and sidewalks shown on the drawings to be removed.

3.05 STRIPPING

A. Excavate topsoil from areas to be built upon, cut or filled, or to have surface improvements, including roadways and walks.

B. Stockpile topsoil on-site and protect from erosion.

C. Excess topsoil, if any, shall be removed from the site and disposed of at CONTRACTOR's expense.

END OF SECTION

SECTION 31 23 00

EXCAVATION, FILL, BACKFILL, AND GRADING

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Excavating, filling, backfilling, and grading for this work includes, but is not necessarily limited to:
   1. Excavating for footings, foundations, roads, and utilities.
   2. Placing and compacting all fill and backfill.
   3. Placement of crushed stone mat below tank slabs and manhole/vault slabs, or other structures where required.
   4. Rough and finish grading prior to paving, seeding, etc.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

C. Allowances: CONTRACTOR shall INCLUDE in the Bid the cost of retaining a Project Soils Engineer (licensed in Kentucky) to perform investigative work and provide recommendations as noted in other sections of Part 3–Execution. Payment to CONTRACTOR for Project Soils Engineer will be adjusted, add or deduct, based upon the actual services rendered (more or less than $15,000). Extra payment will not be made for additional field tests required because of non-conformance with the Specifications. The Bid shall include any services indicated on the Drawings or specified herein to be performed by Project Soils Engineer.

D. Payment:
   1. General excavation shall include all excavation specified, undercutting, fill, backfill, and grading, including rock excavation and including unsuitable foundation material as hereinafter described.
   2. All general excavation shall be included in the Lump Sum Bid. Changes which require additions to or deductions from the excavation will be adjusted on the basis of the unit price for changes contained in the Contract.

E. References to Project Soils Engineer within this Specification shall mean Geotechnical Engineer retained by allowance by CONTRACTOR.

1.02 REFERENCES

A. ASTM C33–Standard Specification for Concrete Aggregates.

B. ASTM D698–Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

C. ASTM D1557–Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

D. Standard Specifications: Unless otherwise indicated, Standard Specifications shall refer to the State of Kentucky, Transportation Cabinet, Department of Highways, Standard Specifications for Road and Bridge Construction, current edition, including all issued

supplemental specifications. Unless specifically stated otherwise, the Measurement and Payment sections of the Standard Specifications shall not apply. Measurement and payment will be made in accordance with terms of the Contract Documents.

1.03 SUBMITTALS

A. CONTRACTOR shall submit samples of materials proposed for use as fill to soils testing laboratory for analysis of their suitability and for recommendations on moisture content during compaction, compaction methods, or other appropriate information.

B. CONTRACTOR shall submit sufficient samples of each different type or classification of soil to obtain representative values.

1.04 JOB CONDITIONS

A. The elevations shown for existing work and ground are reasonably correct, but are not guaranteed to be absolutely accurate. No extras will be allowed because of variations between drawings and actual grades.

B. No soil borings were made for this project. CONTRACTOR shall conduct its own investigation to determine physical conditions at the site which may affect the work.

C. 2,000 psf allowable bearing pressure has been assumed for design of foundations. The Project Soils Engineer retained by the CONTRACTOR shall perform field investigation of foundation excavations to confirm 2,000 psf bearing capacity by probing, drop hammer, or other methods. Project Soils Engineer shall make recommendations for extent of removal and replacement of poor soils as needed to attain the design bearing capacity. Reinforcing steel shall not be placed in foundation excavations until bearing strength has been confirmed.

PART 2–PRODUCTS

2.01 COMPACTED FILL

A. All fill and backfill material designated to be compacted fill shall be granular with no stones larger than 4 inches and shall be reasonably well-graded throughout the particle size range. A minimum 65% of the material shall pass the 3/4-inch sieve, and the material shall be capable of being compaction tested in accordance with ASTM D698, as determined by the Project Soils Engineer. Of that portion of the material passing the No. 4 sieve, not more than 25% shall pass the No. 200 sieve, and material shall have less than 5% clay content. When placing fill during wet weather or in wet areas, this requirement shall be modified to not more than 5% passing the No. 200 sieve. Adequately dewatered areas are not defined as wet areas.

B. Native material may be used as compacted fill if it meets the above specification. CONTRACTOR shall determine whether native material meets the above specification. CONTRACTOR shall provide all needed fill material whether from on-site or off-site at no additional cost to OWNER.

2.02 CRUSHED STONE MAT

A. Crushed stone mat below foundation slabs and footings shall be 1-inch clear crushed stone and shall meet all requirements for No. 57 of Section 805 of Standard Specifications.

2.03 EMBANKMENT FILL

A. Embankment fill shall contain no stumps, brush, rubbish, or other perishable material. The top 12 inches of the earth embankment shall be earthy material free from large stones.

2.04 CONCRETE FILL

A. Concrete fill shall be Class X concrete as defined in Section 03 30 00–Cast-In-Place Concrete.

2.05 CLAY FILL

A. Clay fill shall contain at least 25% clay minerals (material finer than 0.002 mm).

PART 3–EXECUTION

3.01 GENERAL

A. Prior to all excavating, CONTRACTOR shall become thoroughly familiar with the site and site conditions.

3.02 PROTECTION

A. CONTRACTOR shall provide all necessary sheeting, shoring, or other soil retention systems including all labor, material, equipment, and tools required, or as necessary to maintain the excavation in a condition to provide safe working conditions, to permit the safe and efficient installation of all items of Contract work, and to protect adjacent property. CONTRACTOR shall be held liable for any damage which may result to property from excavation or construction operations. Sheeting, shoring, and other soil retainage systems shall be withdrawn or removed in a manner so as to prevent subsequent settlement of structures, utilities, and other improvements.

B. Design of sheet piling and other soil retaining systems shall be the sole responsibility of CONTRACTOR. Where such systems are shown on the drawings, no parameters such as embedment depth, section profile, presence or lack of whalers, etc., or system type or suitability shall be inferred. CONTRACTOR is responsible for designing and providing a fully functional system compatible with construction and site requirements.

C. Nothing in this specification shall be deemed to allow the use of protective systems less effective than those required by the Occupational Safety and Health Administration (OSHA) and other applicable code requirements.

3.03 FINISH ELEVATIONS AND LINES

A. CONTRACTOR is responsible for setting and establishing finish elevations and lines.

3.04 EXCAVATION

A. After the site has been cleared and stripped, the site shall be cut and filled to the indicated subgrade as shown or specified.

B. All excavated material that does not meet the specification for compacted fill or embankment fill or meets the specification but is not required for backfill or fill shall be classified as excess material and shall be removed from the site and disposed of at CONTRACTOR's expense.

C. All material other than suitable bearing soil or bedrock, as determined by the Project Soils Engineer, shall be removed from under concrete to be poured on ground.

D. Excavation for all footings, foundation walls, pits, etc. shall be large enough to provide adequate clearance for the proper execution for the work within them.

E. No footings or slabs shall bear on the top 2 feet of existing soil. Where planned subgrade is within 2 feet of existing grade, remove soils to 2 feet below existing grade and backfill with compacted fill up to subgrade elevation.

F. When excavations reach subgrade elevations as shown on the drawings, or as specified herein, the Project Soils Engineer will observe the bottom material. Where, in the opinion of the Project Soils Engineer, unsuitable foundation material is found at the level of the subgrade, original material below the excavation necessary for construction according to grades shown or specified shall be removed and replaced with material and placing methods as specified under compacted fill and backfill.

G. Excavations that are undercut beneath the foundation shall extend beyond the perimeter of the foundation one foot plus a distance at least equal to the depth of undercut below footing grade.

H. CONTRACTOR shall backfill and compact all overexcavated areas.

3.05 PREPARATION OF SUBGRADE

A. After the site has been cleared, stripped, and excavated to subgrade, thoroughly compact subgrade to the requirements specified for compacted fill below. Scarify and moisture condition the subgrade as recommended by the Project Soils Engineer.

B. Remove all ruts, hummocks, and other uneven surfaces by surface grading prior to placement of fill.

C. All slab-on-grade and road subgrades shall be proofrolled with a heavy rubber-tired construction vehicle (such as a fully loaded tandem-axle dump truck) in the presence of the Project Soils Engineer.

3.06 COMPACTED FILL AND BACKFILL

A. All fill and backfill, except as otherwise specified, shall be compacted fill placed to within 4 inches of the bottom of the topsoil or to the bottom of the structure or other improvement.

B. Unless otherwise noted, structures with a top slab shall not be backfilled until the slab is in place and has reached its specified 28-day strength.

C. In fill areas above existing grade around structures, compacted fill shall be placed within a minimum of 10 feet from the structure.

D. No fill shall be placed under water or over unsuitable subgrade conditions.

E. All fill and backfill except embankment fill and clay fill shall be compacted as follows:
   1. Class 1 Compaction: This class of compaction shall apply to all fill areas under buildings, structures, piping, bituminous roadway and parking areas, curb and gutter, and backfill within 10 feet of structure walls. All compacted material shall be placed in uniform layers not exceeding 8 inches in loose thickness prior to compaction. Each layer shall be uniformly compacted to a dry density at least 95% of the maximum dry density as determined by a laboratory compaction test at the optimum moisture content (ASTM Test Designation D698). Compaction shall be obtained by compaction equipment appropriate for the conditions.
   2. Class 2 Compaction: This class of compaction shall be used in excavated areas beyond 10 feet of structures without any piping or adjacent foundations. Material for backfill shall be granular material as specified above. The material shall be deposited, spread, and leveled in layers generally not exceeding 12 inches in thickness before compaction. Each layer of the fill shall be compacted to at least 90% of the maximum dry density (testing same as Class 1). Compaction shall be obtained by compaction equipment appropriate for the conditions.

F. No frozen material shall be placed nor shall any material be placed on frozen ground.

G. Four inches of clay fill shall be placed and compacted to at least a firm consistency in areas to be seeded or sodded prior to placement of topsoil.

3.07 EMBANKMENT FILL

A. Embankment fill may be placed in fill areas to be seeded or sodded if no piping exists in the fill and the areas are at least 10 feet from any structure.

B. Embankment fill shall be deposited, spread, and leveled in layers generally not exceeding 12 inches in thickness before compaction. Each layer shall be compacted to the degree that no further appreciable consolidation is evidenced under the action of the compaction equipment. The required compaction shall be obtained for each layer before any material for a succeeding layer is placed thereon. Compaction shall be obtained using the hauling and leveling equipment and, in addition, tamping rollers, pneumatic-tired rollers, vibratory rollers, or other types of equipment required to produce the desired results.

3.08 CONCRETE FILL

A. In areas where there is inadequate room for compaction equipment and in other areas as shown or specified, Class X concrete shall be used as fill material.

3.09 GRADING

A. CONTRACTOR shall perform all rough and finish grading required to attain the elevations shown on the drawings.

B. Grading Tolerances:
   1. Rough grade: Buildings, parking areas, and sidewalks ±0.1 feet.
   2. Finish grade: Granular cushion or crushed stone mat under concrete slabs ±0.03 feet.
   3. Lawn areas away from buildings, parking areas, and sidewalks ±0.25 feet.

3.10 PLACING CRUSHED STONE AND GEOTEXTILE FABRIC

A. The same day that the subgrade is exposed, place geotextile fabric on subgrade, and place 12 inches of crushed stone mat below tank slabs, manholes, vault slabs, and basement floors. Compact in place.

B. Geotechnical fabric shall extend up the side edge of the stone mat and extend across the top of the stone to a minimum of 12 inches past the edge of base slab.

3.11 COMPACTION TESTING

A. Compaction tests shall be done by the Project Soils Engineer. Location and frequency of the tests shall be as recommended by the Project Soils Engineer and paid for by CONTRACTOR, under the Project Soils Engineer allowance.

END OF SECTION

SECTION 31 23 19

DEWATERING

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Removal of groundwater to allow belowgrade construction.
   2. Site grading to prevent surface water from entering the excavation.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

C. Payment:
   1. The expense for making all extra excavations necessary to prevent water from interfering with the proper construction of the work and for forming all dams or diversions, digging of sumps or pump wells, bailing, and installation and pumping of wells shall be borne by CONTRACTOR.
   2. The cost for removal of groundwater and surface water shall be included in the prices bid for the work. No separate payment will be made for dewatering whether accomplished by use of sumps and pumps, well point systems, deep wells, or any other method.

1.02 REFERENCES

A. See Division 01, Regulatory Requirements, for permit requirements and water, erosion, and sediment control.

1.03 SYSTEM REQUIREMENTS

A. CONTRACTOR shall, at its own expense, keep the excavation clear of water while structures, mains, and appurtenances are being built, utilities are being installed, and fill and backfill are being compacted. Under no conditions shall the work be laid in or under water. Unless otherwise approved, no water shall flow over the work until the joints are complete or the concrete has set.

B. Dewatering shall be sufficient to lower the piezometric level to at least 2 feet below the bottom of the excavation. Additional lowering shall be provided as necessary to create a stable subgrade.

C. In areas where rock is encountered, the water level shall be kept at or below top of rock but at least 6 inches below bottom of concrete. Additional rock shall be removed as needed to provide clearances.

D. The control of groundwater shall be such that softening or heaving of the bottom of excavations or formation of "quick" conditions or "boils" shall be prevented.

E. Dewatering systems shall be designed and operated so as to prevent the migration or removal of soils.

1.04 QUALITY ASSURANCE

A. All dewatering shall be done in accordance with applicable federal, state, and local code requirements.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

3.01 DEWATERING

A. Dewatering shall be started, and the water level shall be lowered as specified herein prior to beginning excavation and shall be continued until structure, main, or appurtenance has been completed and fill has been placed and compacted to final grade.

B. CONTRACTOR shall provide all necessary materials and equipment to keep the excavation free from water during construction. CONTRACTOR shall at all times have on hand sufficient pumping equipment and machinery in good working condition for all ordinary emergencies, including power outages and shall have available at all times competent workers for the operation of the pumping equipment. The dewatering systems shall not be shut down between shifts, on holidays or weekends, or during the work stoppages.

C. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted fill or backfill, and prevent floatation or movement of all structures and pipelines.

3.02 PROTECTION

A. CONTRACTOR shall take all necessary precautions during the dewatering operation to protect adjacent structures against subsidence, flooding, or other damage. The dewatering system shall be installed and operated so that the groundwater level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property. Any such facilities and structures damaged shall be repaired or replaced to the satisfaction of their owner.

B. Prior to dewatering, CONTRACTOR shall take into account the effect of its proposed dewatering operation on existing private water supply systems and shall make arrangements with property owners for protecting their supplies or providing alternative means of supply.

C. In the event that CONTRACTOR's dewatering operation adversely affects private water supply systems, CONTRACTOR shall provide property owners with alternative potable and nonpotable supplies until dewatering operations are ceased and groundwater levels return to normal. If the water in private water supply wells is contaminated through no fault of CONTRACTOR after restoration of original groundwater levels, OWNER will provide measures to restore water potability. CONTRACTOR is responsible for restoration of the water supply, not its potability after restoration.

D. In areas where continuous operation of dewatering pumps is required, CONTRACTOR shall avoid noise disturbance to nearby residences and businesses to the greatest extent possible by using electric-driven pumps, intake and exhaust silencers, or housing to minimize noise from engine-driven generators or engine-driven pumps.

END OF SECTION

SECTION 32 11 23

AGGREGATE BASE COURSE

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Aggregate base course for roads and parking areas.
   2. Gravel roads.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

C. Repair or replacement of aggregate base course shall be considered incidental and included in the price bid.

D. CONTRACTOR is cautioned that existing private and public roads and shoulders may not hold up to typical construction traffic or activities. CONTRACTOR shall repair all roads, shoulders, and gravel areas damaged in accordance with this section. All paved areas shall also be repaired in accordance with Section 32 11 26–Asphaltic Concrete Paving.

1.02 REFERENCES

A. Standard Specifications: Unless otherwise indicated, Standard Specifications shall refer to the Kentucky Transportation Cabinet, Department of Highways, Standard Specifications for Road and Bridge Construction, latest edition, including all issued supplemental specifications. Unless specifically stated otherwise, the Measurement and Payment sections of the Standard Specifications shall not apply. Measurement and payment will be made in accordance with terms of the Contract Documents.

1.03 DEFINITIONS

A. Street or road shall include streets, roads, driveways, and parking lots.

1.04 SUBMITTALS

A. Submit sieve analysis for proposed materials in accordance with Section 01 33 00–Submittals.

1.05 DRAINAGE DURING CONSTRUCTION

A. CONTRACTOR shall comply with the provisions of Section 204 of the Standard Specifications.

PART 2–PRODUCTS

2.01 AGGREGATES

A. Aggregate for base course shall meet the requirements of dense-grade aggregate of Section 302 of the Standard Specifications.

B. Base course shall be uniformly graded and shall conform to the requirements for DGA of Section 805 for the top 3 inches and Size No. 2 for the remaining depth of base course.

C. Material for top layer of shoulders shall conform to the requirements for DGA of Section 805.

D. Material to replace yielding or unstable subgrade shall conform to Size No. 2 of Section 805.

PART 3–EXECUTION

3.01 PREPARATION

A. The subgrade shall be graded and rolled to provide uniform density and shall comply with the profile and cross sections contained in the drawings. All street subgrade in cut areas and all areas to receive fill shall be proofrolled in the presence of OWNER or ENGINEER with a heavily loaded triaxle dump truck or similar equipment prior to the placement of any fill materials or base course. The subgrade shall be prepared in accordance with Section 207 of the Standard Specifications.

3.02 CONSTRUCTION

A. Base course grade shall be set to allow placement of thickness of asphaltic pavement shown or specified.

B. Depth of base course shall be provided according to the standard cross sections or details provided on the drawings.

C. Depth of base course shall be the existing depth or 9 inches, whichever is greater.

D. Construction of base course shall conform to Section 302 of the Standard Specifications. Each layer of base course shall be wetted and rolled to provide maximum compaction in accordance with requirements therein.

E. The finished base course shall be fine graded in preparation for paving.

F. After final grading, CONTRACTOR shall maintain the base course until asphaltic paving work has been completed.

G. All gravel surfaces damaged during construction shall be replaced. The depth of aggregate shall match existing or 8 inches, whichever is greater.

END OF SECTION

SECTION 32 92 00

RESTORATION

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Placement of topsoil.
   2. Fertilizing.
   3. Seeding.
   4. Mulching.
   5. Maintenance.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

C. Payment: Payment for restoration shall be included in the price bid. Costs for topsoiling, seeding, fertilizer, mulching, and maintenance of restored areas shall be included. One percent of the total Contract price shall be retained following project completion until a uniform 2-inch growth of vegetation is established over all restored areas.

1.02 REFERENCES

A. Standard Specifications: Unless otherwise indicated, Standard Specifications shall refer to the State of Kentucky Transportation Cabinet, Department of Highways, Standard Specifications for Road and Bridge Construction, current edition, including all issued supplemental specifications. Unless specifically stated otherwise, the Measurement and Payment sections of the Standard Specifications shall not apply. Measurement and payment will be made in accordance with terms of the Contract Documents.

B. FS O-F-241–Fertilizers, Mixed, Commercial.

1.03 QUALITY ASSURANCE

A. All work shall be in accordance with Standard Specifications, unless noted otherwise.

B. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

PART 2–PRODUCTS

2.01 TOPSOIL

A. Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds and roots; pH value of minimum 5.4 and maximum 7.0.

B. Topsoil from the site may be used if it meets the above requirements.

2.02 SEED

A. Seed mixture No. II per Standard Specifications.

B. Weed content shall not exceed requirements of the Standard Specifications.

2.03 FERTILIZER

A. Fertilizer shall be FS O-F-241, Type I, Grade A; recommended for grass with 50% of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil to the following proportions: Nitrogen 10%, phosphoric acid 10%, soluble potash 10%. Submit composition deviations to suit site conditions for ENGINEER's approval.

2.04 MISCELLANEOUS

A. Mulching material and asphalt tackifier shall conform to Section 827 of the Standard Specifications. Hay or chopped cornstalks are not acceptable as mulch.

B. Water shall be clean, fresh, and free of substances or matter which could inhibit vigorous growth of grass.

C. Erosion fabric shall be jute matting, open weave.

PART 3–EXECUTION

3.01 DELIVERY, STORAGE AND PROTECTION

A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.

B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

3.02 TOPSOIL

A. Placing topsoil shall be in accordance with Section 212 of the Standard Specifications. Topsoil shall be placed to a uniform depth of 6 inches in place. Topsoil placement shall be incidental to seed, fertilizer, and mulching.

3.03 SEEDING

A. Seeding shall be performed in accordance with Section 212 of the Standard Specifications.

B. Seed shall be applied at the rates specified in Section 212 of the Standard Specifications.

3.04 FERTILIZER

A. Fertilizer shall be applied per Section 212 of the Standard Specifications.

3.05 MULCHING

A. All areas receiving seed shall be mulched.

B. Straw mulching shall be performed in accordance with Section 212 of the Standard Specifications.

3.06 MAINTENANCE

A. Seeding/sodding shall proceed concurrently with construction. Seeding/sodding shall be maintained by CONTRACTOR until grass is well established. Grass is well established when it covers the entire seeded areas to a height of 2 inches.

B. Mow sod at regular intervals to maintain at a maximum height of 2 1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.

C. Immediately remove clippings after mowing.

D. Water to prevent seed/sod and soil from drying out.

E. Roll surface to remove minor depressions or irregularities.

F. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.

G. Immediately reseed areas which fail to show adequate catch. Bare spots shall not exceed 5 square feet in area and not exceed 3% of the total seeded areas.

H. Immediately replace sod in areas which show bare spots or deterioration.

I. Protect seeded areas with warning signs during maintenance period.

J. Correct damage resulting from erosion, gullies, rills, or other causes by filling with topsoil, tamping, refertilizing, and reseeding or resodding if damage occurs prior to acceptance of work.

END OF SECTION

SECTION 35 22 25

SLIDE GATES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: This section includes furnishing, installing, and placing into successful operation two downward opening weir gates, SLG-1 and SLG-2, as listed below and indicated. Slide gates and weir gates shall be complete with gate, guides, framing, operator, and other components as required to make a complete system.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SYSTEM DESCRIPTION

A. Application:
   1. Weir gates shall be suitable for use in wastewater streams that, in addition, may contain iron or aluminum salts, polymers, chlorine solution, or sulfur dioxide solutions.
   2. Weir gates shall be downward acting and shall form a sharp-crested weir.

1.03 WARRANTY

A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year in accordance with GC12.6.

PART 2–PRODUCTS

2.01 MANUFACTURERS

A. Fabricated stainless steel weir gates shall be R-W Gate of Troy, New York, Whipps, Inc. of Athol, Massachusetts, Fontaine USA of Bedford, New Hampshire, or equal.

2.02 GATE CONSTRUCTION

A. The gates shown on the drawings and listed in the specifications shall conform to the latest edition of the AWWA Standard for Slide Gates, AWWA C561, and to the following detailed specifications.

B. Disc: The gate disc shall consist of a flat plate reinforced with structural or formed members welded to the plate. The disc shall be designed to limit the deflection of the gate to 1/360 of its span or 1/16 inch, whichever is less, under design head. The working design stresses shall not exceed the lesser of 40% of the yield strength or 25% of the ultimate strength of the material. All disc components shall have a minimum material thickness of 1/4 inch. Provide ultra-high molecular weight polymer bearing bars on each side of gate.

C. Frame: The gate frame shall consist of guides, invert member, and operator yoke welded or bolted together to form a rigid one-piece frame. The guides shall conform to AWWA C561 requirements and shall have a minimum material thickness of 1/4 inch. The guide slot shall engage the disc plate a minimum of 1 inch. The invert member shall be an angle, channel, or formed shape welded to the bottom of the guide to form a flush surface and to meet with the disc seal. For self-contained gates, the yoke members shall be designed to limit the deflection to 1/360 of its span. The working stresses shall not exceed the lesser of 40% of the yield strength or 25% of the ultimate strength of the material and shall be arranged to permit removing the disc from the frame.

D. Seals: Self-adjusting UHMW seals shall be attached to the frame if necessary so that leakage shall not exceed 0.05 gpm per foot of seal perimeter of the maximum head in the seating and unseating head condition.

E. Stems: Stems shall be 304 stainless steel and shall have a minimum diameter of 1 1/2 inches. Stem threads shall be of the machine rolled or machine cut, full depth Acme type with a 16 microinch finish or better. Stems shall be designed to transmit in compression a minimum of two times the rated output of the hoist at 40 pounds effort on the crank or handwheel. The L/r ratio of the unsupported stem shall not exceed 200. Stem guides, where required to limit the unsupported stem length, shall be bronze or UHMW bushed. All gates having widths greater than two times their height shall be provided with two lifting devices connected by a tandem shaft for simultaneous operation.

F. Stem Covers: Rising stem gates shall be provided with clear butyrate or Lexan stem covers to provide indication of gate position, permit inspection of the stem threads, and to protect the stem from contamination. The stem cover shall be constructed of clear rigid butyrate or Lexan. Vent holes shall be provided to prevent condensation.

G. Provide a horizontal member at 21 inches above the operating floor where handrailing is interrupted by the slide gate.

H. All gates shall be shipped and delivered to the project site fully assembled unless CONTRACTOR requests other arrangements.

I. All gates shall be provided with UHMW seats on the upstream and downstream sides of the disc to prevent metal-to-metal contact between the disc and the frame.

2.03 MATERIALS

A. Weir gate components shall be 304 stainless steel unless otherwise indicated. All welds and weld burn shall be sandblasted or passivated at the factory to provide a clean, uniform finish. Self-adjusting UHMWPE seat/seals shall conform to ASTM D4020.

2.04 MANUAL OPERATORS

A. Pedestal mounted crank-operated gearboxes will be provided where shown. The pedestals shall be of 316L stainless steel construction with a base plate and adaptor plate of minimum 1/2-inch thick stainless steel plate. The gates for this particular project are shown as non self-contained gates with pedestal mounted operators.

B. Unless otherwise specified, operation of the gate shall be by an antifriction handwheel bench stand or by crank operation through right angle bevel gears as shown on the drawings.

Maximum effort shall not exceed 40 pounds on handwheel or crank to raise gate under full operating head. The lift mechanism shall be capable of withstanding, without damage, a handwheel or crank effort of 200 pounds. Bench stand shall be minimum of 36 inches above operating floor. Where possible, the bench stand shall be 42 inches above the operating floor where the gate interrupts handrailing. If the bench stand must be higher to allow operation of the gate, provide a horizontal member across the yoke at 42 inches above the operating floor. The member shall meet OSHA strength requirements for guardrail.

C. A suitable side-mount operator system shall be provided where the bench stand is located over 48 inches above the operating floor. System shall include right angle bevel gear boxes, stainless steel shafting, and flexible couplings as required for operation 36 inches above the operating floor.

D. The hoist nut shall be manganese bronze conforming to ASTM B584 C86500. The hoist nut shall be supported on roller bearings. The hoist shall be outfitted with a stainless steel pinion shaft and the pinion shaft shall be supported by roller or ball bearings. A 2-inch-square nut shall be provided on the pinion shaft to allow operation by a portable electric operator. A lubrication fitting shall be provided for lubrication of the hoist bearings without disassembly of the hoist. Suitable seals shall be provided to prevent entry of foreign matter. The direction of handwheel or crank rotation to open the gate shall be clearly and permanently marked on the hoist. Where the actuators will be interconnected, it shall be by a flexible coupling and stainless steel shaft or extruded aluminum tubing with stainless steel hardware.

2.05 ANCHOR BOLTS

A. CONTRACTOR shall provide anchor bolts necessary for equipment furnished. Anchor bolts shall be Type 316 stainless steel and shall be of ample strength for intended service. Provide anchor bolts in accordance with Section 05 56 00–Anchor Bolts, Expansion Bolts and Resin Anchors.

PART 3–EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 40 05 02

PIPING AND APPURTENANCES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. All piping and valves of every description except as specified in Division 02.
   2. Concrete foundations and anchor bolts for all equipment furnished under this section.
   3. Piping connections to all equipment, whether furnished under this section or not.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

A. Applicable provisions of Section 01 33 00–Submittals cover requirements for shop drawings and Operation and Maintenance Manuals.

B. General arrangement drawings, including support system of 3 inches or larger interior and 3 inches or larger exterior (aboveground) ductile iron, PVC, CPVC, and stainless steel piping shall be submitted to ENGINEER for approval. Shop drawings for all interior and aboveground exterior piping shall be two-line drawings drawn to scale. Drawings shall include proposed materials, length, location, and elevation of pipe, fittings, supports, and valves and appurtenances. Plug valve orientation, including operator and plug orientation, shall be shown on drawings.

C. Grooved joint couplings and fittings shall be referred to on arrangement drawings and product submittals, and be identified by the manufacturer's listed model or series designation.

PART 2–PRODUCTS

2.01 MATERIALS OF CONSTRUCTION

A. Materials of Construction: All materials used in the manufacture, assembly, and painting of piping and valves in contact with water shall be compatible with potable water supplies and in contact with chemical feed systems shall be compatible with the chemicals being used. All glues, solvents, solders, etc., shall likewise be compatible. For instance, no lead-base solders shall be used. Products used in potable water systems shall be UL classified in accordance with ANSI/NSF-61 for potable water service and shall meet the low-lead requirements of NSF-372.

B. Size and Type:
   1. All materials shall conform to the size and type called for in the specifications.
   2. In joining two dissimilar types of pipe, standard fittings shall be used when available. In the event standard fittings are not available, the method of joining shall be selected by CONTRACTOR and submitted for review by ENGINEER.

C. Piping appurtenances shall be made of the materials specified. All appurtenances not designated as to type shall be subject to approval of ENGINEER. All grooved joint couplings and fittings shall be of the same manufacturer.

2.02 PIPE AND PIPE FITTINGS

A. Ductile Iron Piping and Ductile Iron Fittings:
   1. Unless otherwise shown or specified, all piping 3 inches in diameter or larger shall be ductile iron conforming to ANSI/AWWA C151/A21.51, with flanged or grooved joints. Unless otherwise shown or specified, all piping shall be minimum special thickness Class 53 with a minimum rated working pressure of 250 psi for flanged pipe. Pipe wall thickness shall be furnished as required by AWWA C115 for flanged piping; AWWA C606 for grooved piping; special thickness Class 53 minimum unless otherwise shown or specified. Manufacturers of flanged pipe and fittings shall be certified to NSF 61 by an ANSI-accredited third-party certification organization.
   2. The words "Ductile Iron" and the weight and class of pipe shall be plainly marked on each piece of pipe.
   3. All flanged sections of pipe shall be made up in strict accordance with AWWA C115 specifications. No field make-up flanges will be allowed unless strictly conforming to AWWA C115 with facing done after turning pipe through flange.
   4. Flanged joints shall conform to AWWA C110, C111, and C115, and shall be compatible with ANSI B16.1 Class 125. Flanges shall be ductile iron. Flanged gaskets shall be minimum 1/8-inch, full-face, rubber-ring, Toruseal, Flange-Tyte, Maloney, or equal, gaskets. Thicker gaskets shall be provided as recommended by the manufacturer to meet joint tolerance. Flange bolts shall be standard zinc-plated steel with hex head and hex nuts for the rated working pressure and installation conditions specified or shown.
   5. Flanged bolts and nuts installed in decant wells shall be 316 stainless steel.
   6. Flanged fittings shall be of ductile iron with ductile iron flanges. Flanged fittings shall conform to AWWA C110 and ANSI B16.1, as applicable, with a minimum rated working pressure of 150 psi.
   7. See Section 40 23 00 for ductile iron wall pipe requirements.
   8. Unless otherwise specified, all ductile iron piping and fittings shall be cement mortar lined and asphaltic-coated inside. Cement mortar lining shall be in accordance with AWWA C104. Asphaltic coating shall conform to applicable standards herein for the pipe and fittings. Exterior exposed, submerged, and interior piping shall be furnished with outside surfaces prepared by abrasive blasting in accordance with NAPF 500C-03. Cleaned surfaces shall then be shop-primed. Shop-priming shall be with one coat of Tnemec N69-1255 Hi-Build Epoxoline or Tnemec 140-1255 Beige Pota-Poxprimer, or equal, applied to a minimum of 5.0 mils dry thickness. Primer used shall be compatible with proposed finish coats; CONTRACTOR shall verify. It is the intent of this specification that all piping, supports, and appurtenances shall be furnished shop-primed, clean, and ready to accept finish painting by CONTRACTOR with a minimal amount of surface preparation. Preparation and painting shall conform to all requirements and provisions specified in Division 9.
   9. Unless otherwise specified, piping and fittings in scum decant wells shall be asphaltic-coated outside. Asphaltic coating shall conform to applicable standards herein for the pipe and fittings.
   10. All ductile iron piping and fittings designated plant water (PW) and chlorine solution (CLS) shall be ceramic epoxy lined.
      a. Ceramic epoxy lining shall be two-component epoxy lining specifically formulated for corrosion control. Ceramic epoxy lining shall meet the following standards:
         (1) Permeability: 0.0042 perms according to ASTM E96, Procedure A.

(2) Impact Resistance: 1125 inch-lbs according to ASTM D2794.
(3) Immersion in Acids: ASTM D714.
(4) Volume Solids: 88% to 100%.
(5) Coverage: Theoretical–1,411 square feet/gallon at 1.0 dry mil.
(6) Any visible pinholes shall be cause for rejection. All pipe and fittings shall be continuity (holiday) tested for voids and pinholes in accordance with ASTM, NACE, and SSPC standards, performed at 100 to 125 volts per mil based on 40 mil nominal thickness. Minimum test voltage shall be 4,000 volts. All pipe and fittings shall be factory-tested for holidays by the manufacturer, with certified copies of test results accompanying each shipment. These test results shall identify each item by mark number and description and show date tested, inspector identity, and test results. Upon request by ENGINEER, the manufacturer shall perform jobsite test verification.

b. Ceramic epoxy lining shall have a nominal thickness of 40 dry mils for pipe barrel, bell, and spigot. Ceramic epoxy lining shall be centrifugally lance applied. Manufacturer shall be Vulcan Painters, Inc., Protecto 401, Sentry Polymers, Inc., Semstone 140-S, or equal.

11. All ductile iron piping and fittings SCM (Scum) and all piping conveying a combination of these sludges shall be glass-lined and shall receive exterior coating as specified above. The glass lining shall be fused to the inside metal base prepared by blasting by placing the pipe or fitting into a furnace at the appropriate maturing temperature above 1,400°F. The entire coating shall be from 0.008 inch to 0.012 inch thick. It shall have a hardness from 5 to 6 on the Mohs Scale and a density from 2.5 to 3.0 grams per cubic centimeter. The glass lining shall be capable of withstanding a thermal shock of 350°F without crazing, blistering, or spalling. It shall be resistant to corrosion by solutions between pH3 and 10 at 125°F. There shall be no visible loss of surface gloss on the glass lining after immersion of a normal production run sample in an 8% sulfuric acid solution at 148°F for a period of ten minutes. In addition, when tested according to ASTM C283, it shall show a weight loss of not more than 3 milligrams per square inch. Taps in glass-lined piping and fittings shall be made prior to glass-lining.
12. Drainage Piping: All process drain piping shall be ductile iron.

B. Stainless Steel Piping:
1. Piping where shown on the drawings as being "SS" shall be 304L stainless steel with a 2D finish conforming to AISI 304L and ASTM A240, minimum gauges as follows:
   a. Up to and including 12-inch diameter: 12 gauge.
   b. 14-inch up to and including 18-inch diameter: 11 gauge.
   c. 20-inch diameter: 10 gauge.
   d. Greater than 20-inch diameter: 8 gauge.
2. Piping 3 inches in diameter or larger shall conform to ASTM A778 (welded fittings shall conform to ASTM A774) or shall conform to ASTM A312 (welded fittings shall conform to ASTM A403).
3. Bolts, washers, and follower flanges shall be made of 304 stainless steel. The nuts shall be low silicon bronze per QQ-C-591, Alloy 651. All anchor bolts shall be 304 stainless steel. Follower flanges on interior piping may be galvanized ductile iron.
4. Connections between sections of pipe shall be by special flanged joints. These joints shall be designed so that individual pipe sections can be rotated independently of adjacent sections for alignment purposes. Flanged joints shall be of the face ring follower flange type with through bolts. Gaskets shall be 45 to 55 durometer neoprene, full face. Expansion joints shall be provided where necessary. Where connections are made to ductile iron or PVC piping, flanges shall be compatible with the mating pipe. As an alternative to flanged connections between sections of stainless steel interior piping,

a grooved pipe connection with stainless steel or galvanized steel couplings and fasteners as previously specified will be allowed where approved by ENGINEER. All connections to valves or equipment shall be flanged.

5. All 304L material shall conform to the chemical requirements of ASTM A240 and AISI 304L. The maximum carbon content shall be limited to 0.030%.
6. Flanges shall be shop-welded to the pipe. All welding shall be by the gas tungsten arc welding (GTAW), or gas metal arc welding (GMAW) method. Filler wire shall be added to all welds to provide for a cross section of weld metal equal to, or greater than, the parent metal. Butt welds shall have full penetration to the interior surface, and gas shielding shall be provided to the interior and exterior of the joint.
7. Interior weld beads shall be smooth and evenly distributed with an interior projection not exceeding 1/16 inches beyond the pipe I.D. The outside weld area shall be wire brushed. Brushes shall be of stainless steel and used only on stainless steel. All discoloration and deposits left by welding shall be removed by pickling. If welding is performed on site, piping shall be immersed in acid solution and acid-washed for manufacturer-determined temperature and period of time.
8. After manufacture of pipe and fittings, all stainless steel shall be passivated by immersion in a pickling solution of from 5% to 25% of nitric acid (65% strength) and 1% to 3% hydrofluoric acid (60% strength), both by volume, in water at a bath temperature of 120°F to 140°F for a minimum of 10 to 15 minutes, as determined by test. Scrubbing shall be completed as required. Immediate final thorough rinsing shall be completed in clean hot water followed by drying. Parts shall be free of iron particles or other foreign material.
9. The exterior finished weld and heat affected zone on stainless fabrications shall be cleaned using a pickle paste solution. All interior welds where accessible shall be cleaned with Scotch Brite EXL, or equal, deburring wheel. All weld spatter on the entire fabrication shall be removed.
10. All field welding of stainless steel pipe shall be minimized and subject to the review of ENGINEER. Field welding shall be shielded metal arc welding (SMAW) or GTAW for piping 8 inches and smaller. All field welding shall be accomplished by certified welders and using qualified procedures in accordance with ASME Section IX. Acceptance criteria to ASME B31.9. All field welds shall be wire-brushed after completion, and grinding shall be provided as required. All field welds shall be passivated with Oakite 33, or equal solution. Upon request, QW 484 forms shall be submitted to ENGINEER.

C. PVC Piping:
   1. Chemical Feed and Chemical Solution Piping:
      a. Except as otherwise specified, all chemical feed piping and chemical solution piping shall be constructed of PVC.
      b. PVC material shall conform to ASTM D1784, Class 12454-B. PVC piping and fittings shall be PVC 1120, Schedule 80, high impact pipe conforming to ASTM D1785 with bells conforming to ASTM D2672. Solvent weld fittings shall conform to ASTM D2467, and for threaded, ASTM D2464.
      c. All piping shall be approved for use by the National Sanitation Foundation. All pipe delivered to the job site shall be properly marked for type, grade, and design stress rating. Expansion joints shall be provided where needed. In general, all joints shall be solvent weld, except where flanges are required or where transition to another pipe material is required. Underground gravity pipe shall be installed in compliance with ASTM D2321 except as otherwise specified herein. Underground pressure piping shall be installed in compliance with ASTM D2774.

d. All exterior exposed or PVC piping in open tanks shall be formulated with sufficient ultraviolet light screeners to provide for long-term outdoor exposure with no deleterious effects.
e. Aboveground PVC shall not be used where smoke generation, noise transmission, or physical abuse/durability are an issue.

D. CPVC Piping:
1. Sodium Hypochlorite (SH), sodium hydroxide, chemical feed, chemical solution, and other chemical piping shall be CPVC.
2. CPVC material used in manufacturing piping and fittings shall conform to ASTM D1784, Class 23447.
3. CPVC piping shall be CPVC 4120, Schedule 80, high-impact conforming to ASTM F441. Piping and fittings shall be approved for use by the National Sanitation Foundation. All pipe delivered to the jobsite shall be properly marked for type, grade, and design stress rating. Expansion joints shall be provided as required. In general, all joints shall be solvent weld. All piping shall be supported at spacing not exceeding that recommended by the manufacturer.
4. Solvent cement for CPVC piping shall be specifically designed for piping systems receiving chemical resistance. Cement shall be Oatey EP42, IPS Weld-On ZZ724, or equal.
5. CPVC Schedule 80 pressure fittings shall meet requirements of ASTM F437 (threaded type) and ASTM F439 (solvent weld socket type). All internal threads shall be machine-taped to the requirements of ANSI/ASME B1.20.1. The quick burst strength of the fittings shall be equal to or greater than the burst strength of the equivalent Schedule 80 CPVC pipe. Fittings shall be made of CPVC 23447-B, or better.
6. All exterior or CPVC piping in open tanks shall be formulated with sufficient ultraviolet light screeners to provide for long-term outdoor exposure with no deleterious effects.

2.03 VALVES

A. Gate Valves:
1. Shutoff valves in cast or ductile iron lines containing wastewater and shutoff valves in potable and non-potable water lines 4-inch diameter and larger shall be AWWA C509, cast iron, resilient seat, nonrising stem, 150 psi working pressure with O-ring packing box, American, American AVK, or equal.
2. Shutoff valves in potable and non-potable water lines 4-inch diameter and larger shall be cast iron, double disc, parallel seat, bronze trimmed, O-ring packing box with nonrising stem, manufactured to AWWA C500 specifications, Class 150, American R/D, or equal.
3. Shutoff valves in potable and non-potable water lines, 2 1/2-inch diameter through 3-inch diameter shall be gate valves, Class 150, bronze or iron body bronze-mounted, solid wedge disc, threaded, rising stem, Nibco T-131, Milwaukee Valve 1150, or equal. Provide unions for ease of valve removal.
4. Underground valves shall have extended stem, cast iron telescopic valve box, and key. Exposed valves not in reach of the floor (7 feet to centerline, or greater) shall have chain wheel operator. All other valves shall have handwheels. Right angle operators shall be provided, if required, because of valve position.
5. Asphaltic varnish and coal tar coating are not allowed on interior valves. Exterior buried valves shall be fusion-bonded epoxy-coated or epoxy-coated as specified in Division 09. Interior and exterior exposed valves shall be furnished with all surfaces (except galvanized or stainless steel) prepared in accordance with near white grade SSPC Specification No. 10 removing all dirt, rust scale, and foreign materials. Surface

preparation shall be done at such time during the assembly process as to preclude damage to the valve once assembled. Cleaned surfaces shall then be shop-primed. Shop-priming shall be with one coat of Tnemec N69-1255 Hi-Build Epoxoline primer, or equal, applied to a minimum of 5.0 mils dry thickness. Primer used shall be compatible with proposed finish coats; CONTRACTOR shall verify. A fusion-bonded epoxy system is an acceptable alternative to the specified primer. It is the intent of this specification that all valves, supports, and appurtenances shall be furnished shop primed, clean, and ready to accept finish painting by CONTRACTOR with a minimal amount of surface preparation. Preparation and painting shall conform to all requirements and provisions specified in Division 9.

B. Plug Valves:

1. Shutoff valves in ductile iron lines containing wastewater and all sludge lines, scum lines, and drainage lines shall be DeZURIK Series PEF 100% port Eccentric, Val-Matic Cam-Centric Series, or equal.
2. Eccentric-type valves shall be nonlubricated rectangular-ported with resilient faced plugs and end connections. The plug profile shall be of a cylindrical eccentric shape so that the vertical face of the plug is straight and the horizontal face is eccentrically curved in relation to the plug shafts. Segmented ball valves with spherical plugs shall not be acceptable. Port areas shall be at least 100% (PEF) through 20 inches of full pipe area. Valve bodies shall be of ASTM A126, Class B cast iron. Resilient plug facings shall be chloroprene or Buna-N, suitable for use with wastewater.
3. Valves shall be furnished with corrosion-resistant seats, replaceable oil-impregnated permanently lubricated 316 stainless steel sleeve-type bearings and grit shaft seals on both upper and lower bearing journals that comply with the latest edition of AWWA C507 and C504. All valves shall include grease fittings on upper and lower journals. Bodies of 3-inch and larger valves shall be furnished with a minimum 1/8-inch-thick machined smooth-welded overlay seat of not less than 90% nickel. Seat area shall be raised surface completely covered with weld to ensure that the plug face contacts only nickel. Sprayed or screwed-in seats are not acceptable. Valve shaft seals for valves 4 inches and larger shall be of the type using a stuffing box and pull-down packing gland. Shaft seals shall be designed for replacement with the line pressurized at design pressure with the plug in both the open and closed position. For submerged service, or in valve manholes, valve vaults, or underground utility structures, valves shall have stainless steel bolts.
4. The design of the valve and stuffing box assembly shall be such that the packing can be adjusted or completely replaced without disturbing any part of the valve or operator assembly except the packing gland follower. Stuffing boxes shall have a depth sufficient to accept at least four rings of Buna-N vee-type packing. Valve seating adjustment shall be accomplished without removing the valve from the pipe line and with pressure in the line. For lever-operated valves, the plug position retention friction device shall consist of an adjustable phenolic cone that clamps on the plug shaft or a moly sheath. Metal-to-metal friction devices shall not be acceptable.
5. All plug valves for buried service, all plug valves 8 inches in diameter or larger, all plug valves with direct pressure greater than 75 psi or reverse differential pressure greater than 25 psi, or larger shall have worm gear actuators. All gearing shall be enclosed in a semisteel housing and be suitable for running in a lubricant with seals provided on all shafts to prevent entry of dirt and water into the actuator. The actuator shaft and the quadrant shall be supported on permanently lubricated bronze bearings. Actuators shall indicate valve position. Buried or submerged valves shall be supplied with actuators suitable for direct burial or submergence, shall be mounted on a gasketed and totally enclosed actuator mounting bracket, and shall have a totally enclosed and gasketed

cover. All other valves shall be furnished with lever actuators. Supply one lever for every four valves of like size furnished. All valves 3 inches and smaller shall have individual levers. Valves not in reach of the floor (7 feet to centerline or greater) shall have chain wheel worm gear actuators. Right angle actuators shall be furnished, if required, because of valve position. Supply sufficient galvanized or electroplated chain with chain wheel so loop through chain wheel is within 3 feet of floor.

6. Extension stems and other accessories shall be provided and as required to allow easy access for operation of valves within reach from walkways or other access points. Extend operators to at least 24 inches above walkways. Extension stems for quarter-turn plug valves shall be fabricated from 2-inch pipe, and extensions stems for gear-operated valves shall be fabricated from steel or stainless steel rod. Extension stems, stem guides, and related hardware and accessories for submerged valves shall be stainless steel. Stems shall be provided with 2-inch operating nut or other mechanism as shown on the drawings. Stem guides shall be provided as recommended by the manufacturer. Maximum unsupported length of stem shall be limited to an l/r ratio of 200.
7. Asphaltic varnish and coal tar coating are not allowed on interior valves. Exterior buried valves shall be fusion-bonded epoxy-coated or epoxy-coated as specified in Division 09. Interior and exterior exposed valves shall be furnished with all surfaces (except galvanized or stainless steel) prepared in accordance with near white grade SSPC Specification No. 10 removing all dirt, rust scale, and foreign materials. Surface preparation shall be done at such time during the assembly process as to preclude damage to the valves once assembled. Cleaned surfaces shall then be shop-primed. Shop-priming shall be with one coat of Tnemec N69-1255 Hi-Build Epoxoline primer, one coat of Tnemec No. 141 Pota Pox 80 epoxy primer, or equal, applied to a minimum of 5.0 mils dry thickness. Primer used shall be compatible with proposed finish coats; CONTRACTOR shall verify. A fusion-bonded epoxy system is an acceptable alternative to the specified primer. It is the intent of this specification that all valves, supports, and appurtenances shall be furnished shop-primed, clean, and ready to accept finish painting by CONTRACTOR with a minimal amount of surface preparation. Except as noted below, valve interior shall be shop-primed and finish painted with epoxy painting system or fusion-bonded epoxy system as specified above. Preparation and painting shall conform to all requirements and provisions specified in Division 09.

C. Telescopic Valves: Telescopic valves shall be as manufactured by Vulcan Industries, Watt Telescopic Valve as manufactured by Latanick Equipment Co., or equal. Valve sizing and travel shall be as shown on the drawings. Valves shall consist of type RS, rising stem floor stands. Valves shall be constructed of stainless steel throughout, including valve stem and nut, extension stem, floor stands, telescoping tube, tube rails, baffle, mounting hardware, and all assembly bolts. Telescoping tube shall be 6 inches longer than travel. Indicator shall be clear plastic stem cover with ruled scale marked off in 1/2-inch increments. Receiving pipe, companion and backup flanges, and 1/4-inch neoprene gasket, and exterior baffle assembly shall be provided as part of the complete assembly. Receiving pipe shall be constructed of minimum 12 gauge rolled and smooth-welded stainless steel and shall be approximately 1/2-inch diameter and 6 inches longer than telescoping tube. Mating flanges shall be constructed of stainless steel or cast iron. Anchor bolts shall be included and shall be constructed of stainless steel.

D. Miscellaneous Valves, Strainers, Hose Bibs, and Valve Boxes:
1. Shutoff valves in potable and non-potable water lines smaller than 1 inch 2 1/2 inches shall be Nibco T-585 (threaded), Nibco S-585 (solder joint), or equal, full port ball valves. Provide extended stems for valve operators installed with insulated pipe.

2. Shutoff valves in PVC piping shall be hand-operated 150 psi union-type PVC ball valves, Chemtrol TU Series Tru-bloc, Walworth Series 8927, or equal. Valves and all components including O-rings shall be compatible with chemicals in piping. PVC valves and union shall not be painted. Valves in sodium hypochlorite piping shall be fitted with a relief hole from center port to high pressure side of valve.
3. As shown on the drawings, supply curb stop shutoff valves for NPW yard piping. Curb stops in NPW yard piping shall be Ford B44-777M ball valves with Minneapolis-type curb boxes complete with lid and 6-foot stationary rod, or equal. Curb stop near disinfection facilities for 1-inch NPW service to building shall be Ford B71-444M ball valve with a Minneapolis-type curb box complete with lid and 6-foot stationary rod, or equal. Provide two 4-foot shutoff keys to operate valves. Lids shall have the word "WATER" cast into the top of the covers or shall be blank. Curb stops shall be placed on minimum 3 cubic feet of concrete placed on undisturbed earth.
4. Hose Bibs:
    a. Hose bibs providing non-potable water shall be provided with a removable key handle.
    b. Exterior hose valves shall be Woodford Model 65, Watts, or equal, freezeless wall hydrants with integral ASSE 1019 backflow preventer outlet, permanent valve seat, and brushed chrome exterior face with 3/4-inch outlet garden hose threads and 3/4-inch inlet. Provide loose key operator with each exterior hose bib. Provide round or square box recessed enclosure with locking door for the hose bib. CONTRACTOR shall coordinate wall thickness with recessed enclosure depth.
    c. Interior hose valves shall be Woodford Model 24, Watts, or equal. Provide 3/4-inch garden hose thread, 3/4-inch inlet, and ASSE 1011 approved backflow preventer outlet. Interior hose valves shall be equipped with approved vacuum breaker, Watts 8A, Nidel Model 34H, or equal. Provide metal handle and chrome plate finish. Provide loose key with each faucet.
5. Valves in NPW piping used for fluid control as shown on the drawings shall be Nibco, or equal, globe valves rated for 200 psi WOG. Valves shall be bronze with TFE disc.

2.04 PIPING APPURTENANCES AND MISCELLANEOUS MATERIALS

A. General: Piping appurtenances shall be made of the materials specified. All appurtenances not designated as to type shall be subject to approval of ENGINEER.

B. Spray Nozzles: Spray nozzles shall be furnished and installed as shown on the drawings. Foam control spray nozzles shall be No. 22561-13020 as manufactured by Spraying Systems Co. or equal. The spray nozzle shall be brass construction with a 1/4-inch NPT inlet connection. The nominal spray angle at 10 psi is 130 degrees. Spray nozzles shall be hinged for ease of flushing. Contractor shall provide necessary fittings for complete installation of spray nozzles.

C. Non-potable Water Caution Signs: Place non-potable water signs permanently mounted at every hose bib, hydrant, or faucet on the non-potable water system. Sign shall include as a minimum the wording "CAUTION, NON-POTABLE WATER, DO NOT DRINK" or similar standard language. Signs shall be Brady Safety sign, or equal, minimum size 7 inches by 10 inches, constructed of fiberglass. Mount signs on building wall or structures with stainless steel screws or fasteners. At yard hydrant, provide post-mounted signs on steel U-channel posts.

D. Floor Boxes: Provide floor boxes in concrete floors or slabs and as shown on the drawings. Floor boxes shall be Neenah R-7506-B, Clow F-5690, or equal. CONTRACTOR shall verify

that all floor boxes are large enough to accommodate all operating nuts and wrenches. Provide one "Tee" valve key operator for each valve manhole and one for each tank with tank or channel drain.

E. Mechanical Seals: Mechanical seals shall be 316 stainless steel Link Seal, or equal. Link seals shall be provided with 316 stainless steel bolts, nuts, and fasteners. Sleeve diameter shall be provided and mechanical seals installed as recommended by the manufacturer.

PART 3–EXECUTION

3.01 GENERAL

A. Refer to requirements specified in Division 01 for equipment installation, quality control, testing, supervision, start-up, and operator training.

3.02 INSTALLATION

A. Interior or Exposed Piping:
   1. Provide pipe supports for all piping. Pipe support spacing and type shall, at a minimum, conform to manufacturer's recommendations unless more restrictive requirements are specified. All interior or exposed pipelines shall be securely supported by adjustable saddles, brackets, or adjustable hangers supported directly by concrete, masonry work, or tile. Strap hangers, tin clips, or U-hooks will not be acceptable. Piping shall be supported, even though not shown on the drawings, using base fittings and concrete pads to 6 inches above the floor, Anvil 264, B-line, or equal, adjustable pipe saddle stand with floor flange to 6 feet above the floor, and supporting clamps or inserts more than 6 feet above the floor. In general, the maximum spacing of supports shall not exceed 10 feet on centers. Except as specified for plumbing system, all PVC piping shall be supported using galvanized supports for flexible piping except as indicated. Stainless steel supports and fasteners shall be used in submerged locations, tanks, wet wells, or as indicated. Piping shall be adequately supported and braced to resist thrust at bends, rubber expansion joints, and joints. Insulation saddles shall be used at supports of insulated piping. CONTRACTOR shall furnish and place hangers, supports, wall pipes, and sleeves in the forms before concrete is poured wherever needed or shown on the drawings.
   2. All piping shall be adequately supported and braced to resist thrust at bends and joints. Use base elbows, poured concrete, or rod ties. The weight of the piping shall be supported independently of connected equipment.
   3. All supports and parts shall conform to the latest requirements of ASME B31 and shall have a structural safety factor of 5. Accurate weight balance calculation shall be made by CONTRACTOR to determine the required supporting force at each hanger location and the pipe weight load at each equipment connection. CONTRACTOR shall be responsible for the installation and application of the supports. Pipe hangers shall be capable of supporting the pipe weight load in all conditions of operation. The hangers shall allow free expansion and contraction of the piping to prevent excessive stress in the piping. Where vertical movement up to 1/8 inch is anticipated, a precompressed variable spring support shall be used. Rigid hangers shall be provided with a means of vertical adjustment after erection. Where horizontal piping movements are greater than 1/2 inch, or where the hanger rod angularity from vertical is greater than 4 degrees from hot to cold position of the pipe, the hanger pipe and structural attachments shall be offset in a manner that the rod is vertical in the hot position. Hangers and supports shall be spaced in accordance with ASME B31 and as indicated in this specification. Pipe

supports shall be placed before and after a valve, expansion joint, or equipment so stress will not be transferred to them.

4. CONTRACTOR shall provide calculations of pipe supports if requested by ENGINEER.
5. All carbon steel parts shall be furnished with all surfaces (except galvanized or stainless steel) prepared in accordance with near white grade SSPC Specification No. 10 removing all dirt, rust scale, and foreign materials. Surface preparation of all carbon steel parts shall be performed at such time during the assembly process as to preclude damage to the equipment once installed and assembled. Cleaned surfaces shall then be shop-primed. Shop-priming shall be with one coat of Tnemec N69-1255 Hi-Build Epoxoline primer, Tnemec 140-1255 Beige Pota-Pox, or equal, applied to a minimum of 5.0 mils dry thickness. Primer used shall be compatible with proposed finish coats; CONTRACTOR shall verify. It is the intent of this specification that all equipment, supports, and appurtenances shall be furnished shop primed, clean, and ready to accept finish painting by CONTRACTOR with a minimal amount of surface preparation. Preparation and painting shall conform to all requirements and provisions specified in Division 09.
6. The following maximum spacings shall be provided for supports:

MAXIMUM HORIZONTAL PIPE HANGER AND SUPPORT SPACING

	Copper Tubing			
Nominal Pipe or Tube Size	Water Service ft	Vapor or Air Service ft	Ductile Iron (See Note 1) ft	PVC/CPVC Pipe (See Note 2) ft
1/4	5	5		
3/8	5	6		Continuous
1/2	5	6		Continuous
3/4	5	7		Continuous
1	6	8		4
1 1/4	7	9		4
1 1/2	8	10		4
2	8	10		4
2 1/2	9	10		4
3	10	10		4
4	10	10	10	4
5	10	10	10	4
6	10	10	10	9
8	10	10	10	9
10	10	10	10	10
12	10	10	10	10
14			10	10
16			10	10
18			10	10
20			10	
24			10	
30			10	
36			10	
42			10	

Note 1: Provide at least one hanger per pipe length located as close to the flange or joint on barrel as possible.

Note 2: Spacing is based on Schedule 80 at 100°F. For Schedule 40 or higher temperatures, provide shorter span. Consult local plumbing code and manufacturer's recommendations as required. Minimum spacing requirements shall govern.

7. The length of hanger span and support spacing in the above table refers to straight lengths of pipe. When there are changes of direction in pipe, two supports shall be placed less than three-fourths the full span in the table. When practical, a hanger shall be located immediately adjacent to a change in direction of piping. Where there are concentrated loads between supports such as valves, spacing shall be based on load calculations rather than this table.
8. Anchored supports shall include a stainless steel U-bolt and nuts bolted to the wall bracket.
9. Exposed piping shall run straight, in neat parallel lines, and shall be located far enough from walls, ceilings, and floors to permit access for covering of pipe and painting work. Care shall be taken in laying out piping so that there is no interference with the proper location of piping for other purposes or other equipment and shall be run with regard to the requirements of each service.
10. Piping shall not interfere with headroom or clear floor space. Unless otherwise shown, piping shall run exposed in buildings, except in finished areas. Unless otherwise shown, small water piping in finished areas shall be concealed in interior walls, above suspended ceilings, or under floors where possible. Water piping shall not be installed in exterior walls, unless otherwise shown or noted on the drawings. Joints shall not be used under floor slabs. Unless otherwise shown, piping under floor slabs shall clear floor slabs or footings by a minimum of 6 inches. Pipes under floors shall have a minimum of 6 inches of sand cover. Plates shall be provided on all uncovered pipes passing through floors, walls, and ceilings constructed of materials other than poured concrete. Plates shall be on exposed sides and shall be chrome-plated, spring and snap type.
11. Except for flanged piping, an ample number of standard weight ground joint unions and a shutoff valve shall be provided in all pipelines and at all equipment. CONTRACTOR shall provide 3/8-inch tapped and plugged connections in suction and discharge of all pumps for testing.
12. All glass-lined, PVC, and stainless steel piping shall be protected from dust and debris deposits on the inside of the pipe during storage and installation. Protection shall be by plastic film or coated paper banded over the pipe ends to be removed just prior to installation. Any foreign matter shall be removed from the pipe interior at the time of installation.
13. On clear liquids and on lines carrying solids where neither side of the pipeline drains, the valve shall be positioned so that the seat end of the valve is downstream of the shutoff pressure. The highest pressure should always be on the back side of the plug, except for a valve installed in a vertical pipe. On sludge or slurry lines where one side of the line normally drains, it is preferential to install the seat end of the valve upstream so that the valve cavity drains empty. Where possible in horizontal pipelines, the valve shall be installed with the axis of the plug horizontal and the plug in the top of the valve when in the open position. In vertical pipelines carrying sludge or slurries, the seat end shall be at the top of the valve.
14. The locations and elevations of existing piping are approximate. Any changes in the pipe location or elevation shall be reviewed by ENGINEER.

15. CONTRACTOR shall submit shop drawings showing new pipe routing and existing pipe removal. CONTRACTOR shall be responsible for final pipe routing and shall route new piping as required to minimize conflicts. Piping shown on the drawings is approximate only. Not all existing piping, conduit, equipment, etc., are shown on the drawings. CONTRACTOR shall field-verify locations. CONTRACTOR shall reroute existing piping, conduit, etc., as indicated or as required to install new piping or equipment. CONTRACTOR shall remove and relocate existing pipe supports as required to install new piping. CONTRACTOR shall provide all piping, fittings, flange fillers, and other appurtenances as required to provide functional system at no additional cost to OWNER.
16. All connections except those adjacent to storage or feeder areas shall have guards that will direct any leakage away from space occupied by workers.
17. Exposed pipes in all areas containing hazardous chemicals that are located above shoulder level shall be provided with continuous drip collection trays and coupling guards that will eliminate the spraying or dripping of these chemicals onto workers.
18. All piping containing or transporting corrosive or hazardous chemicals shall be identified with labels every 10 feet (3 m) and with at least two labels in each room, closet, or pipe chase. Color-coding shall also be used.

B. Plug Valve Installation: Whenever possible, CONTRACTOR shall install plug valves shaft in horizontal and plug above flowline when in the open position. Valve installation shall be in accordance with manufacturer's requirements.

C. Wall and Other Pipe Penetrations:
1. CONTRACTOR shall furnish and place hangers, supports, wall pipes, sleeves, and floor boxes in the forms before concrete is poured wherever needed or shown on the drawings.
2. Where pipes pass through concrete members without wall fittings shown, CONTRACTOR shall provide sleeves in the forms for the piping. The sleeve diameter shall not exceed the pipe o.d. plus 2 inches (or the pipe flange o.d. plus 1 inch, as applicable), unless otherwise shown on drawings. If the concrete members are to be watertight, the annular space around the pipe shall be sealed with a mechanical seal. Sleeves shall be steel unless noted otherwise and shall include minimum 1-inch waterstop. For copper pipe, provide an elastomeric sleeve on pipe where it passes through walls or slabs.
3. Where plain wall pipes are shown or indicated on the drawings, CONTRACTOR may substitute a flanged end wall pipe, if desired, for the purposes of pressure testing specified herein.
4. Where pipe passes through nonwatertight walls, the annular space shall be grouted full. Where pipes pass through nonwatertight floors, the sleeve shall extend 1 inch above the finished floor elevation. The annular space shall remain open, except the annular space between a rated space (example–Class 1, Division 1, Group D hazardous location) and a nonrated space shall be sealed with a mechanical seal.
5. Where new pipes go through existing watertight concrete members, CONTRACTOR shall core a hole through the member, unless otherwise shown on the drawings. The annular space between the concrete and pipe shall be sealed with a mechanical seal. Where new pipes go through existing nonwatertight concrete or masonry members, holes shall be cored and annular space between the concrete and the pipe shall be grouted full (walls or floors at rated spaces) or remain open (floors at nonrated spaces). Prior to any coring, CONTRACTOR shall locate reinforcing steel in the member and shall consult with ENGINEER to determine optimal location for the core. Plug

abandoned pipes and wall pipes, after pipe and fittings removal flush to the concrete surface, with nonshrink grout, to achieve a watertight seal.

6. Nonshrink grout shall be as specified in Division 03.
7. No chases or recesses shall be made in poured concrete for pipe installation, and no pipe shall run in poured concrete unless called for in the drawings or specifications or permitted by ENGINEER. The cutting or core drilling of concrete for pipe shall be avoided wherever possible, and in no case where such cutting or core drilling is necessary shall reinforcing rods be cut or disturbed without requesting the opinion of ENGINEER. All openings for pipe work shall be neatly patched in a workmanlike manner.

D. Cleaning and Disinfection: All equipment and materials shall be clean before installation. CONTRACTOR shall disinfect and flush the potable water system before it is put online. Water main shall be disinfected according to AWWA C651.

3.03 FIELD QUALITY CONTROL

A. CONTRACTOR shall include the cost of all testing, cleaning, and disinfection in the price Bid.

B. All work shall be inspected, tested, and approved by the appropriate authorities and in accordance with federal, state, and local rules and regulations. All work shall also be tested as specified in this section. Unless indicated by ENGINEER in writing before testing begins, all tests shall be witnessed by ENGINEER and others as necessary. Test results shall be recorded, and reports or appropriate certificates shall be submitted to ENGINEER in triplicate.

C. All new piping shall be tested. All piping, interior or exposed, shall be subject to test before being covered with insulation or paint. All piping and appurtenances shall be watertight or airtight and free from visible leaks.

D. All piping shall be flushed or blown out after installation and prior to testing. CONTRACTOR shall provide all necessary piping connections, water, air, test pumping equipment, water meter, bulkheads, valves, pressure gauge and other equipment, materials, and facilities necessary to complete the specified tests. CONTRACTOR shall provide all temporary sectionalizing devices and vents for testing.

E. Pressure Tests: The test pressure in all lines shall be held for one hour during which time the leakage allowance shall not exceed that specified. In case repairs are required, the pressure test shall be repeated until the pipeline installation conforms to the specified requirements. Pumps, air compressors, instrumentation, and similar equipment shall not be subjected to the pressure tests.

Fluid Abbreviation or Name	Minimum Test Pressure in psi	Test Medium	Leakage Allowance Designation
SH, SHS	150	Water	"A"(1)
SCM	25	Water	"A"
CLS, PW, SB	150	Water	"A"

[1] Leakage allowance Designation "A" shall mean zero leakage.

F. Prior to making final connection between new and existing piping, new piping shall be tested as specified above.

END OF SECTION

SECTION 40 23 00

BURIED PIPING AND APPURTENANCES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. All underground piping and valves of every description.
   2. Excavation, dewatering, and backfilling for all work under this section unless otherwise noted.
   3. Concrete foundations and anchor bolts for all equipment furnished under this section.
   4. Underground piping connections to all equipment, whether furnished under this section or not.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 REFERENCES

A. Standard Specifications: Unless otherwise indicated, Standard Specifications within this section shall refer to the Kentucky Transportation Cabinet, Department of Highways, *Standard Specifications for Road and Bridge Construction.*

B. Plumbing Code: Unless otherwise indicated, plumbing code within this section shall refer to the Kentucky State Plumbing Law, Regulations and Code.

C. Ten State Standards.

D. Kentucky Division of Water Code.

1.03 SUBMITTALS

A. Shop Drawings:
   1. See Section 01 33 00–Submittals for shop drawing submittal procedures.
   2. General arrangement drawings of 3 inches or larger exterior (belowground) ductile iron piping shall be submitted to ENGINEER for approval. Drawings shall include proposed materials, length, location, and elevation of pipe, fittings, pipe restraint, valves, and appurtenances.

PART 2–PRODUCTS

2.01 MATERIALS OF CONSTRUCTION

A. All materials used in the manufacture, assembly, and painting of piping and valves in contact with water shall be compatible with potable water supplies and in contact with chemical feed systems shall be compatible with the chemicals being used. All glues, solvents, solders, etc., shall likewise be compatible. For instance, no lead-base solders shall be used. All materials in contact with water to be used for potable water supplies shall be National Sanitation Foundation (NSF)-approved.

B. Size and Type:
   1. All materials shall conform to the size and type called for in the specifications.
   2. In joining two dissimilar types of pipe, standard fittings shall be used when available. In the event standard fittings are not available, the method of joining shall be standard selected by CONTRACTOR and submitted for review by ENGINEER.

C. Piping appurtenances shall be made of the materials specified. All appurtenances not designated as to type shall be selected by CONTRACTOR and submitted for review by ENGINEER.

2.02 MANHOLES

A. General: All provisions of Drawing 01-975-43A, enclosed in these specifications, except those contrary to provisions delineated herein or on the drawings shall apply.

B. Unless otherwise specified or shown on the drawings for special manholes, all manholes shall be reinforced concrete precast manholes. Reinforced concrete manhole base sections, riser sections, cones, and flat slabs shall conform to the requirements of ASTM C478. Solid precast manhole bottoms shall be provided. Manholes shall be provided with minimum diameters as shown on Drawing 01-975-43A. Diameters shall be increased from the minimum for the following:
   1. To provide between adjacent pipe a minimum distance equal to one-half the outside diameter of the largest pipe measured circumferentially along the inside face of the manhole.
   2. To accommodate flexible manhole connections used.
   3. To accommodate multiple valves or valve assemblies.

C. Manhole top sections shall be precast reinforced eccentric cones unless precast reinforced flat slabs are specifically required or shown on the drawings or are necessary because of shallow depth. Flat slabs shall have opening offset unless otherwise required or shown. Flat slabs shall be designed for HS20 loadings.

D. Manhole sections shall be provided in such combinations as to conveniently make up the required depth of the manholes. A maximum of two handling holes per manhole section will be permitted. All joints shall be tongue and groove and shall be sealed with rubber O-ring gaskets of circular cross section or mastic compounds. Gaskets shall conform to ASTM C443. Mastic compounds shall be Ram-nek, Kent-Seal, Mas-stik, or equal.

E. Except as otherwise specified, connection of pipes to manholes shall be with Kor-N-Seal, A LOK, Interpace, PS-X, or equal joint. The joint shall provide a flexible, watertight connection between pipe and manhole. Manhole connections for storm sewer mains and leads may be made with poured-in-place concrete during completion of manhole interior in lieu of above.

F. Steps:
   1. Manhole steps shall be provided by manhole manufacturer. Manhole steps shall be M.A. Industries, Inc. PS1-PF with 1/2-inch-diameter steel reinforcing rod, conforming to ASTM A615, Grade 60, with molded copolymer polypropylene covering conforming to ASTM D4101, Type PP200B33450Z02, or equal.
   2. Steps shall be inserted in manhole riser, cone, and flat slab sections prior to the initial set of the concrete in accordance with ASTM C478 and shall have maximum embedment and pullout resistance in accordance with ASTM C478.

3. The top step shall be located 10 inches or less from the top of the manhole cone section. Steps shall be a maximum 16 inches apart.

G. Frames and Covers:
1. Frames and covers shall be provided for the openings indicated on the drawings.
2. For standard manholes, frames shall be Neenah R-1550, or equal, with Type B lid, with two concealed pickholes equipped with self-sealing gaskets. Frames for valve manholes shall be Neenah R-6065 with Type B lid with two concealed pickholes equipped with self-sealing gaskets, or equal.
3. Covers (Floor Door) shall be Bilco Type J (single leaf), or equal, aluminum covers. The covers shall include a positive hold open arm with release handle and a tubular compression spring operator. Provide covers with slam lock with inside handle and removable key wrench. All aluminum surfaces in contact with concrete shall be painted with bitumastic coating. Hardware shall be stainless steel throughout.
4. Covers shall be reinforced for minimum 300 pounds per square foot live load. Provide stainless steel or fiberglass unistruts as necessary attached to covers to mount accessories, guides, etc.

H. Valve boxes shall be provided for all buried valves. Valve boxes shall be Tyler/Union 6850 Series, 4 inches through 12 inches, or equal. Extension heights shall be provided as required. Lids shall be marked for appropriate use. CONTRACTOR shall verify that all valve boxes are large enough to accommodate all operating nuts and wrenches. Provide one "Tee" valve key operator for each valve manhole and one for each tank with tank or channel drain.

I. Floor boxes shall conform to Section 40 05 02–Piping and Appurtenances.

2.03 BURIED PIPING

A. Ductile Iron Piping and Ductile Iron Fittings:
1. Unless otherwise shown or specified, all underground piping 3 inches in diameter or larger shall be ductile iron conforming to AWWA C151/A21.51 with mechanical joints or push-on joints. Pipe wall thickness shall be furnished as required by AWWA C150 for buried piping with the depth of cover as shown on the drawings for laying condition 4, minimum Special Thickness Class or Pressure Class as listed below, unless otherwise shown or specified.

Pipe Size (Inches)	Special Thickness (Class)	Pressure Class
3	53	---
4	53	---
6	53	---
8	53	---
10	53	---
12	53	---
14	52	---
16	52	---
18	52	---
20	---	250
24	---	250

2. The words "Ductile Iron" and the weight and class of pipe shall be plainly marked on each piece of pipe.
3. Except as otherwise specified, underground pipe shall have mechanical joints or push-on joints conforming to AWWA C110 and C111 with vulcanized styrene butadiene rubber gaskets conforming to AWWA C111. Gaskets that include metal locking segments vulcanized into the gasket to grip the pipe and provide joint restraint are not acceptable. Bolts on exterior joints shall be high-strength low-alloy steel (Corten, or equal), conforming to AWWA C111. Certificate to that effect shall be provided.
4. All mechanical and push-on joints on water main and force main shall be bonded with cable bond conductors or electrobond conductivity strips.
5. Restrained joints shall be provided in accordance with Part 3-Execution. Mechanical joints shall be restrained with MEGALUG® Series 1100, by EBAA Iron Sales, Inc., UNIFLANGE Series 1400 by Ford Meter Box Co., Inc., or equal, restraint. Push-on joints for ductile iron piping shall be restrained with MEGALUG® Series 1700, by EBAA Iron Sales, Inc., UNIFLANGE Series 1450 by Ford Meter Box Co., Inc., Flex-Ring or Lok-Ring by American Cast Iron Pipe Company, TR Flex by U.S. Pipe Company, or equal.
6. Joint restraint is not required for gravity sewers, drains, and those pipes designated in Paragraph 1. of 3.02.G. Infiltration/Exfiltration Tests.
7. Underground pipe shall have mechanical joint ductile iron fittings conforming to AWWA C110 and C111 or AWWA C153 compact fittings with a minimum rated working pressure of 150 psi. Gaskets for fittings shall be as specified for underground piping.
8. All ductile iron piping and fitting designated to receive ceramic or ceramic-epoxy interior coating shall be provided as specified in Section 40 05 02–Plumbing and Appurtenances.
9. All ductile iron piping and fittings designated SCM (Scum), shall be glass-lined and shall receive exterior coating as specified above. The glass lining shall be fused to the inside metal base prepared by blasting by placing the pipe or fitting into a furnace at the appropriate maturing temperature above 1,400°F. The entire coating shall be from 0.008 inches to 0.012 inches thick. It shall have a hardness from 5 to 6 on the Mohs Scale and a density from 2.5 to 3.0 grams per cubic centimeter. The glass lining shall be capable of withstanding a thermal shock of 350°F without crazing, blistering, or spalling. It shall be resistant to corrosion by solutions between pH 3 and pH 10 at 125°F. There shall be no visible loss of surface gloss on the glass lining after immersion of a normal production run sample in an 8% sulfuric acid solution at 148°F for a period of 10 minutes. In addition, when tested according to ASTM C283, it shall show a weight loss of not more than 3 milligrams per square inch.
10. Piping and fittings for installation in manholes and wet wells shall be flanged and provided as specified in Section 40 05 02–Piping and Accessories.
11. Drainage Piping: All process drain piping and all underground piping designated as drain (D) shall be ductile iron. All underground drainage piping more than 2 feet from building walls shall be ductile iron as specified. Connections to drainage piping from buildings shall be made within 2 feet from the building wall and shall be made with a Fernco, or equal, flexible coupling.

B. Sanitary Force Main: Fittings on PVC pipe shall be ductile iron mechanical joint conforming to requirements specified for ductile iron fittings with appropriate transition fittings and gaskets. Ductile Iron Fittings shall be glass-lined.

2.04 VALVES (VALVES FOR UNDERGROUND SERVICE ARE SPECIFIED IN DIVISION 23)

A. Valves shall conform to Section 40 05 02–Piping and Appurtenances.

2.05 HYDRANTS

A. Yard Hydrants:
   1. Yard hydrants shall be Mueller A-411, or equal, with one 2 1/2-inch hose nozzle and threaded lead to accept copper pipe. Yard hydrant shall have a maximum working pressure of 150 psig. Provide one operating wrench for each hydrant. Provide all yard hydrants with 1 1/2-inch hose adaptor from 2 1/2-inch hose nozzle and four adaptors to 3/4-inch hose from 1 1/2-inch hose nozzle. Hydrant cover depths of 7 feet shall be provided.
   2. Yard hydrants shall be furnished with all surfaces (except galvanized or stainless steel) prepared in accordance with near white grade SSPC Specification No. 10 removing all dirt, rust scale, and foreign materials. Surface preparation shall be done at such time during the assembly process as to preclude damage to the pressure relief valves and yard hydrants once assembled. Cleaned surfaces shall then be shop-primed. Shop priming shall be with one coat of Tnemec N69-1255 Hi-Build Epoxoline primer, or equal, applied to a minimum of 5.0 mils dry thickness. Primer used shall be compatible with proposed finish coats; CONTRACTOR shall verify. It is the intent of this specification that all valves, hydrants, supports, and appurtenances shall be furnished shop primed, clean, and ready to accept finish painting by CONTRACTOR with a minimal amount of surface preparation. Preparation and painting shall conform to all requirements and provisions specified in Division 09.

2.06 CONCRETE

A. All concrete poured under this Contract, unless shown or specified otherwise, shall conform to the requirements of Division 03.

PART 3–EXECUTION

3.01 INSTALLATION

A. Underground Piping:
   1. Except where noted or specified, all ductile iron underground piping shall be laid in accordance with AWWA C600 with the conditions that (a) blocking shall not be used to support pipe and (b) all bends and fittings shall be restrained as specified below, and pipe joints shall be restrained in all directions from all bends and fittings to the length as specified below.
   2. For restrained pipe joints, all underground ductile iron pipe joints (except for the branch of tees and dead ends) shall be restrained to the length listed below in all directions from all bends and fittings. The branch of tees and all dead ends shall be restrained to three times the length listed below. All joints on yard and fire hydrant leads shall be restrained. Where wall penetrations occur at less than the length indicated below, the wall fittings shall also be restrained. Additional restraint shall be provided inside of structures as required.

MINIMUM LENGTH (IN FEET) RESTRAINED PIPE FROM BENDS OR FROM BENDS OR FITTINGS (POLYWRAPPED AND MINIMUM 3 FEET BURY DEPTH

	Test Pressure, psi				
	10	25	50	100	150
Pipe Size, Inches					
3 to 12	5	18	18	36	36
14 to 18	5	18	18	36	54
20 to 24	5	18	36	54	72
30	10	18	36	72	90
36	10	18	36	72	
42	10	36	54	90	
48	10	36	54	90	

3. CONTRACTOR shall excavate and lay all pipe to the line and grade shown on the drawings with bell ends uphill wherever possible. If not possible, CONTRACTOR shall excavate and lay pipe to the line and grade shown on the drawings with bell ends in the direction of laying. Grade stakes will be required for all lines. Water piping and chemical solution piping shall have a minimum of 3 feet of cover. Unless shown otherwise, drainage piping shall clear floor slabs or footings by a minimum of 6 inches.
4. Where piping is laid in native soil, the width of trench below the top of the pipe shall not exceed the nominal diameter of the pipe plus 2 feet for all pipelines. Where the maximum trench width is exceeded, the pipe shall be placed in a concrete cradle or a stronger pipe used. If the maximum trench width is exceeded for any reason other than as otherwise specified, the concrete cradle or the stronger pipe shall be placed at CONTRACTOR's expense, unless CONTRACTOR can demonstrate that the pipe to be used is compatible with the resulting load applied.
5. Except as otherwise specified, all underground pipe shall be bedded in crushed stone or crushed gravel aggregate. Ductile iron piping, except as otherwise specified, shall be placed using Class "C" Bedding Details as shown on Drawing 01-975-43A. All other piping shall be placed using Class "B" Bedding Details as shown on Drawing 01-975-43A. CONTRACTOR shall perform all necessary excavation and shall provide all required materials to provide this bedding. Bedding material shall conform to the requirements of ASTM C33. The material shall be hard, tough, and durable and shall meet the following gradation requirements:
6. Gradation No. 9, 68, or 57 conforming to the Standard Specifications for rigid pipe such as ductile iron or concrete.
7. Gradation No. 9 conforming to the Standard Specifications for flexible pipe such as PVC.
8. Sand, as required, shall conform to Section 804.07 of the Standard Specifications.
9. CONTRACTOR shall furnish ENGINEER with a sieve analysis of the bedding material for approval prior to construction.
10. No materials native to the trench shall be used as bedding material unless they meet the above specifications. Native material may be used for ductile iron piping if it consists mostly of sand and contains no stones larger than 3/4 inch.
11. Immediately before placing the pipe, bedding shall be shaped by hand to fit the entire bottom quadrant of the pipe between bell holes. Bell holes shall be large enough to permit proper making of the joint but not larger than necessary to make the joint. All adjustments to line and grade must be done by scraping away or filling in bedding under the body of the pipe. Bedding must be tamped into place. If necessary to obtain uniform contact of the pipe with the bedding, a template shall be used.

12. Any pipe or fittings cracked in cutting or handling or otherwise not free from defects shall not be used. Pipe must be kept clean of mortar, cement, clay, sand, or other material. When PVC piping is installed during hot weather, it shall be laid in the trench with slack or permitted to cool to ground temperature before it is cut to length for making final connections. PVC expansion joints shall be provided where needed.
13. Trenches shall be kept water-free and dry during bedding, laying, and jointing. CONTRACTOR shall provide, operate, and maintain all pumps or other equipment necessary to drain and keep all excavation pits and trenches and the entire subgrade area free from water under any and all circumstances that may arise.
14. Material that is to be placed from the bedding material around and to 1 foot above the top of all pipes shall be termed cover material. Except as otherwise specified, (a) cover material shall consist of durable granular particles ranging in size from fine to coarse in a substantially uniform combination, (b) unwashed bank-run sand and crushed bank-run gravel will be considered generally acceptable for cover material, (c) no stones larger than 3/4 inch in their greatest dimension shall be allowed in the cover material, and (d) native materials may be used if they conform to the above specifications. Cover material for copper piping shall be sand.
15. Cover material shall be deposited in the trench for its full width on each side of the pipe, fittings, and appurtenances simultaneously. Cover material shall be placed over the top of the pipe to the height as shown on Drawing 01-975-43A for Class "B" (minimum 12 inches) or Class "C" (minimum 6 inches) Bedding. This backfill shall be placed by hand in 6-inch layers and shall be compacted using hand tamping bars and/or mechanical tampers. If bedding material conforming to any of the above three crushed stone or crushed gravel gradations is used as cover material, it need not be tamped. The remaining 6 inches to make up the required 1 foot of select cover material for Class "C" Bedding shall be granular material specified previously with no stones larger than 3/4 inch.
16. All cover material shall be placed in maximum 6-inch layers and compacted by hand tamping. Compaction shall be equivalent to that described under "Compacted Fill and Backfill" as specified in Section 31 23 00–Excavation, Fill, Backfill and Grading.
17. Except as otherwise specified, all backfill above 1 foot above the pipe shall be "Compacted Fill and Backfill" as specified in Section 31 23 00–Excavation, Fill, Backfill and Grading.
18. The locations and elevations of existing piping and manholes are approximate. Where necessary, existing piping shall be exposed by CONTRACTOR to confirm location and elevation before installing new piping. Any changes in pipe location or elevation shall be approved by OWNER.
19. General Excavation:
    a. CONTRACTOR shall do all excavation, undercutting, dewatering, and backfilling necessary for work under this contract unless otherwise noted. All trees, shrubs, and improved areas outside the excavation shall be protected from damage.
    b. Work shall conform to other sections of Division 02, except where modified by this section.
    c. Pipe shall be placed only on dry foundations. No extra payment will be made to CONTRACTOR for dewatering.
    d. Excavation shall include all necessary clearing of excavated areas, tree removal, all grubbing, all wet, dry, fill, and rock excavation, the removal of pavement, filling, and all incidental work such as tunneling, sheet piling, shoring, underpinning, pumping, bailing, transportation, and all fill and backfilling. All above work shall be included in the Lump Sum Bid.
    e. CONTRACTOR shall excavate whatever materials are encountered as required to place at the elevations shown, all pipe, manholes, and other work as required to

complete the project as shown. The bottom of the excavation shall be leveled off, all loose and disturbed soil shall be removed, and it shall be hand-tamped prior to pipe, manhole, etc., installation. Where requested by ENGINEER, original material below the excavation necessary for construction according to grades shown or specified shall be removed and replaced in accordance with Section 31 23 00–Excavation, Fill, Backfill and Grading. Payment will also be in accordance with Section 31 23 00–Excavation, Fill, Backfill and Grading.

f. The excavation at the crossing of all underground utility services in place shall be as narrow as practicable. All underground services shall be protected from damage and maintained in service at their original location and grade during the process of the work. Any damage to underground services shall be replaced or repaired at no cost to OWNER or to the owner of the service. The present underground services are located in accordance with available data. Encountering these services at a different location or encountering services not shown shall not release CONTRACTOR from the above-stated conditions.

g. Excavated native material that is unsuitable or not required for filling shall be removed from the site. Materials to be used for fill and suitable for this purpose shall be deposited where required except that no fill shall be placed where trenches for sewers, water lines, or other services will be located until after the trench work is completed.

h. CONTRACTOR shall provide adequate shoring, sheet piling, and bracing to prevent earth from caving or washing into the excavation and shall do all shoring and underpinning necessary to properly support adjacent or adjoining structures. All shoring, sheet piling, and underpinning must be maintained until permanent support is provided.

i. Any water, drainage, gas, sewer, or electric lines encountered in the excavation that are not to be disturbed shall be properly underpinned and supported. Any service connections encountered that are to be removed shall be cut off at limits of the excavation and capped in accordance with the requirements of or permits governing such removals. Any permits required for this work will be obtained by OWNER upon request of CONTRACTOR.

20. Valve Boxes: The valve box shall be centered and plumb over the wrench nut of the valve with the box cover flush with the finished ground elevation. Solid 4-inch concrete blocks shall be placed under the base of valve boxes so that the bottom of the base is about 2 inches away from contact with the valve bonnet. The valve box shall not transmit shock or stress to the valve.
21. Yard Hydrants: Yard hydrants shall be set on a slab of concrete at least 1 cubic foot in size and against a 3-cubic-foot minimum concrete brace laying against undisturbed earth. Backfill at base of hydrant shall be 1 cubic yard of coarse gravel. It shall be the responsibility of CONTRACTOR to ensure that the hydrants are set to the proper grade. Extensions or fittings shall be provided as required.

3.02 FIELD QUALITY CONTROL

A. CONTRACTOR shall include the cost of all testing, cleaning, and disinfection in the price bid.

B. All work shall be inspected, tested, and approved in accordance with federal, state, and local rules and regulations. All work shall also be tested as specified in this section. Unless indicated in writing before testing begins, all tests shall be witnessed by ENGINEER and others as necessary. Test results shall be recorded and reports or appropriate certificates shall be submitted to ENGINEER in triplicate.

C. All new piping shall be tested. All underground piping shall be backfilled or properly secured to avoid damage during testing. Should underground piping fail test, CONTRACTOR shall be responsible for removal and replacement of backfill. All piping, interior or exposed, shall be subject to test before being covered with insulation or paint. All piping and appurtenances shall be watertight or airtight and free from visible leaks. Manholes and appurtenances shall be free of any visible leaks. Any leakage shall be sealed by methods approved by OWNER, from the exterior of the manhole or structure. Precast reinforced concrete manhole risers and tops shall be tested in accordance with ASTM C497.

D. All piping shall be flushed or blown out after installation prior to testing. CONTRACTOR shall provide all necessary piping connections, water, air, test pumping equipment, water meter, bulkheads, valves, pressure gauge and other equipment, materials, and facilities necessary to complete the specified tests. CONTRACTOR shall provide all temporary sectionalizing devices and vents for testing.

E. Pressure Tests:
1. Pressure tests shall be performed as required by AWWA C600, unless otherwise noted herein.
2. When test medium for piping is water, all air shall be removed from piping by flushing, opening vents, loosening flanges, utilizing equipment vents and/or installation of corporations at high points in system. Presence or absence of air will be determined during pressurization of the piping system.
3. The test pressure in all lines shall be held for one hour during which time the leakage allowance shall not exceed that specified. In case repairs are required, the pressure test shall be repeated until the pipeline installation conforms to the specified requirements. Pumps, air compressors, instrumentation, and similar equipment shall not be subjected to the pressure tests.

Fluid Abbreviation or Name	Minimum Test Pressure in psi	Test Medium	Leakage Allowance Designation
CLS, SH, SHS,	150	Water	"A"(1)
SCM	25	Water	"A"

(1) Leakage allowance designation "A" shall mean not more than 0.002 gallons per hour per inch diameter per 100 feet of buried pipe for all piping except buried mechanical joint or push-on joint pipe. Buried mechanical and push-on joint pipe shall meet the leakage specifications of AWWA C600.

F. Prior to making final connection between new and existing piping, new piping shall be tested as specified above.

G. Natural Gas Piping System Pressure Testing
1. Gradually increase the pressure to not more than one half of the test pressure; then increase pressure in steps of approximately one-tenth of the test pressure until the required test pressure is reached. Examine all joints and connections with a soap bubble solution or equivalent method. The piping system exclusive of possible localized instances at pump or valve packing shall show no evidence of leaking. After testing is complete, slowly release the pressure in a safe manner.

2. All necessary piping, fittings, blind flanges, and apparatus for conducting tests shall be furnished by the CONTRACTOR and comply with the requirements of NFPA 54 and as required by local code.
3. All new rough-in distribution piping and affected portions of existing systems connected to, shall be subjected to a pneumatic test pressure utilizing clean, dry air and must be demonstrated to be absolutely tight when subjected to the pressures and time durations listed in table below. All equipment and components designed for operating pressures of less than the test pressure shall not be connected to the piping system during test.
4. Test pressure shall be measured with a manometer or with a pressure-measuring device designed and calibrated to read, record or indicate a pressure loss caused by leakage during the pressure test period.
5. Piping system shall withstand test pressure specified without showing any evidence of leakage or other defects. Any reduction of test pressures as indicated by pressure gauges shall be deemed to indicate a leak unless can be attributed to some other cause.
6. Leakage shall then be located by means of an approved gas detector, a noncorrosive leak detection fluid, or other approved leak detection method. Matches, candles, open flames or other methods that provide a source of ignition shall not be used.
7. When placing system into operation appliances and equipment shall not be placed into operation until piping system has been checked for leakage with above requirements.

H. Infiltration/Exfiltration Tests:
1. Infiltration/exfiltration tests for all gravity sewers, drains, and those pipes designated as D will be as follows. If groundwater is above the pipe, measurements shall be taken to determine the rate of infiltration into the pipe. If groundwater is below the pipe, the stretch of pipe shall be plugged at its downstream end and water shall be placed inside the pipe to fill the pipe. Measurements shall then be taken to determine the rate of leakage out of the pipe by filling the pipe. Concrete pipe shall be filled with water at least 8 hours before measurements are taken. CONTRACTOR shall furnish all labor, water, and materials necessary for making the tests. The rate of infiltration or leakage shall not exceed 100 gallons per inch diameter per mile per day for any stretch of pipe measured. CONTRACTOR shall immediately make all necessary repairs to bring infiltration or leakage within the above acceptable limits.
2. Air test procedure may be used, when allowed by ENGINEER, for the above-listed pipe designations and shall be conducted as follows:
   a. Clean pipe to be tested.
   b. Plug all pipe outlets with suitable test plugs. Brace each plug securely. Add air slowly to the portion of the pipe installation under test until the internal air pressure is raised to 4.0 psig.
   c. After an internal pressure of 4.0 psig is obtained, allow at least 2 minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.
   d. When pressure decreases to 3.5 psig, start stopwatch. Determine the time in seconds that is required for the internal air pressure to reach 2.5 psig. Minimum permissible pressure holding times for runs of single pipe diameter and for systems of 4-inch, 6-inch, or 8-inch laterals in combination with trunk lines shall be as recommended by National Clay Pipe Institute.
   e. If the pipe to be tested is submerged in groundwater, determine the height of groundwater above the crown of the sewer. This is the pressure head of water above the pipe because of groundwater submergence over the sewer. All gauge

pressures in the test should be increased by the pressure head of water above the pipe.

f. ENGINEER may elect to test sewers in groundwater by measuring the infiltration through the use of a weir provided in the manhole at the downstream end of the sewer being tested.

g. The air test may be dangerous if a line is improperly prepared. It is extremely important that the various plugs be installed and braced in such a way as to prevent blowouts. Inasmuch as a force of 250 pounds is exerted on an 8-inch plug by an internal pipe pressure of 5 psi, it should be realized that sudden expulsion of a poorly installed plug or of a plug that is partially deflated before the pipe pressure is released can be dangerous.

h. As a safety precaution, pressurizing equipment should include a regulator set at 10 psi to avoid overpressurizing and damaging an otherwise acceptable line. No one shall be allowed in the manholes during testing.

3.03 CLEANING AND DISINFECTION

A. All equipment and materials shall be clean before installation. CONTRACTOR shall disinfect and flush the potable water system before it is put online. Water main shall be disinfected according to AWWA C651.

3.04 REPAIR AND RESTORATION

A. Tree Removal: Tree removal and grubbing necessary for installing sewer, water, and other work shown shall be included in the Lump Sum Bid.

B. Pavement Repair: Unless otherwise specified, CONTRACTOR shall replace all bituminous and concrete pavement removed or damaged during performance of the work. Concrete pavement replacement shall conform to Division 03. Bituminous pavement replacement shall conform to Division 02.

C. Cleanup:

1. Upon completion of the work, all improvements disturbed by CONTRACTOR's operations shall be repaired or replaced. Broken concrete, rubble fill, and other excess material shall be removed from the site and wasted.
2. All areas used for the storage of materials or the temporary deposit of excavated earth shall be leveled off and cleaned up. All surplus material, tools, and equipment shall be removed, and the premises shall be left free of everything of the kind.
3. All pipes and manholes shall be flushed until clean, and all debris and mud shall be removed.

3.05 DEMOLITION

A. All exterior piping removals, including manholes and appurtenances and abandonment, shall be by CONTRACTOR. The locations and elevations of existing piping are approximate. Where necessary, existing piping shall be exposed before installing new piping. Any changes in pipe location or elevation shall be reviewed by ENGINEER.

B. CONTRACTOR shall remove or abandon all existing piping and appurtenances as noted. Unless otherwise shown or specified, piping and appurtenances to be removed shall become the property of CONTRACTOR and shall be removed from the site for salvage or disposal. Unless otherwise shown or specified, piping shown or specified to be abandoned shall have each end plugged with nonshrink grout. Nonshrink grout shall be as specified in

Division 3. Wherever excavations cross piping to be abandoned, piping shall be removed to the limits of the excavation and the ends shall be filled as specified above.

C. Valve boxes and exposed valves and operators on piping to be abandoned shall be removed. All concrete surfaces to remain shall be patched as required to provide a smooth surface. Repiping and connections to new piping shall be as specified for new piping.

D. It is the responsibility of CONTRACTOR to remove the following, including piping and appurtenances, as specified, and patch all holes resulting therefrom unless specified or shown otherwise. The intent of these specifications is to require that the removal of materials, patching of all existing holes, and repiping be done in a workmanlike manner. All costs shall be included in the Lump Sum Bid.

END OF SECTION

SECTION 46 43 21

SCUM DECANT PIPE

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: This section includes furnishing, installing, and placing into successful operation seven scum decant pipes (SDP-1 through SDP-7). The piping and appurtenances shall be furnished by the same supplier.

B. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

1.02 SUBMITTALS

A. Submittals for motors associated with equipment specified in this section shall include data sheets from the motor manufacturer. Data sheets from the equipment manufacturer or supplier are not acceptable.

B. Submit shop drawings and operating and maintenance manuals in accordance with Division 01, and include the following: At ENGINEER's request, submit certification that the manufacturer has not less than ten years of experience in the application, design, and manufacturer of similarly specified sludge collecting equipment.

1.03 WARRANTY

A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year in accordance with GC12.6.

PART 2–PRODUCTS

2.01 MANUFACTURERS

A. Scum pipes and appurtenances shall be as manufactured by Siemens Water Technologies of Waukesha, Wisconsin, Jim Myers & Sons, Inc. (JMS) of Charlotte, North Carolina, or equal. This listed equipment is part of the Lump Sum Base Bid and will be considered as establishing the type, function, appearance, and quality required, as defined in the General Conditions.

2.02 SCUM DECANT PIPE

A. SDP-1, SDP-2, and SDP-4 through SDP-7 shall each span one 20-foot wide tank. SDP-3 shall span one 41-foot wide tank. Continuous travel of scum through the series of pipes shall be 167 feet. Each mechanism shall be independently operated and shall be capable of minimum 75 degree rotation in either direction.

B. Pipe shall be Type 304 stainless steel and be 12 inch-diameter with a minimum 0.25-inch wall thickness. A 60 degree wide, slotted opening shall be cut symmetrical about the vertical axis to provide a weir over which scum can flow into the pipe when rotated. Edges of the slot shall be parallel to the longitudinal axis of the pipe. Full periphery bands not less than 2 inches wide shall be left in the pipe at intervals not exceeding 2 feet to act as stiffeners. The pipe shall have a vertical deflection of no more than 1/4-inch over the entire length of the pipe.

2.03 SUPPORTS

A. The revolving pipe shall be supported at each end such that a slight vertical or horizontal misalignment will not interfere with the smooth operation of the pipe. The pipe shall be supported by and revolve in a rolled Type 304 stainless steel collar that shall be welded to an adjustable Type 304 stainless steel plate. The open end support shall have a replaceable UHMW-polyethylene bearing liner securely fitted within the internal periphery of the collar to provide ample bearing surface for the pipe without crushing the seal.

B. Provide mid-span support for SDP-3 off the face of nearest column as shown on the Drawings.

2.04 SEALS

A. A suitable watertight seal shall be provided for the open end of the pipe. This seal shall be so constructed that it will remain effective even with a slight misalignment of the pipe and collar. The seal shall not be affected by grease, mild acids, or alkalis. The seal shall be readily renewable without removing the pipe from the supporting brackets and shall not bind or impede the smooth action of the revolving pipe. The seal shall be held in place by an external type 316 stainless steel adjustable retainer ring.

2.05 SET COLLAR

A. A formed minimum 0.25-inch-thick Type 304 stainless steel set collar shall be provided at the non-drive end support to retain the skimmer pipe end seal. The worm gear shall retain the end seal on the drive end support.

2.06 SCUM DECANT PIPE OPERATING MECHANISM

A. The skimmer pipe shall be motor operated by means of a vertical worm gear drive. The worm gear drive shall consist of a cast iron, cast semi-steel, or nylon worm gear wheel and cast iron or nylon worm rigidly mounted on a structural Type 304 stainless steel support. The worm shaft shall revolve in bearings and the worm gear shall drive the pipe. The bearings shall be cast iron with babbitted bushings and the worm shaft shall be 1018 cold-finished steel. The worm gear and worm shall be replaceable. Grease lines, if required, shall connect to the worm bearings, be run to the operating floor level, and be secured to Type 304 stainless steel attachment brackets.

B. The Type 304 stainless steel vertical pipe stem shall be suitably secured to the worm shaft such that slight misalignment shall not affect the mesh of the worm and worm wheel.

C. The skimmer pipe shall be operated by a motor actuator fitted to a Type 304 stainless steel floor stand of welded construction having a non-rising lifting screw.

2.07 ELECTRIC OPERATORS

A. Motor-operated scum pipes shall be provided with Model MX electric valve actuator, as manufactured by Limitorque, or equal. The electric valve actuator shall include the motor, starter, control transformer, selector switches, pushbuttons, operating unit gearing, limit switch gearing, limit switches, torque switches, stem nut, declutch lever, and auxiliary handwheel as a self-contained unit mounted on a bevel gear operator. The electric valve actuator shall operate manually through the use of three pushbuttons marked "Skim" and "Backskim." "Skim" and "Backskim" pushbuttons shall be momentary contact, requiring the pushbutton to be depressed for the scum pipe to rotate. The actuator shall also be equipped with a Local-Remote selector switch that will allow for remote digital control. Provide auxiliary contacts on the Local-Remote selector switch for remote indication of selector switch in "Remote" position. Provide contacts for remote indication of scum pipe position (i.e., Skim, Home, or Backskim) and "Actuator Alarm" or "Failed" indication. The actuator motor and all electrical enclosures shall be NEMA 4X suitable for installation outdoors.

B. The scum pipe actuator motor shall be specifically designed for scum pipe actuator service and shall be of high starting torque, totally enclosed, nonventilated construction with motor leads brought into the limit switch compartment without having external piping or conduit box. Motor shall be 480 volt, three phase, and insulation shall be NEMA Class F and rated at 90°C rise over a 40°C ambient for continuous service. The motor shall be of sufficient size to open or close the scum pipe against the maximum expected differential pressure when voltage to the motor terminals is 10% above or below nominal voltage. The motor duty rating shall be sufficient for one complete Skim to Backskim to Skim (or reverse) cycle without exceeding its temperature rating. The motor shall be prelubricated and all bearings shall be of antifriction type.

C. The power gearing shall consist of generated spur or helical gears of heat-treated steel and worm gearing. The worm gearing shall be hardened alloy steel, and the worm gear shall be of alloy bronze accurately cut. All power gearing shall be grease lubricated. Ball or roller bearings shall be used throughout.

D. Limit switches and associated gearing shall be an integral part of the scum pipe actuator. Limit switch gearing shall be of the intermittent type, totally enclosed in its own gear case to prevent dirt and foreign matter from entering the gear train, grease-lubricated, and shall be made of bronze or stainless steel. Limit switches shall be of the adjustable type capable of being set to trip at any point of scum pipe travel between skim and backskim and not be subject to breakage or slippage from over-travel. Limit switches shall be of the heavy-duty type with rotary wiping action.

E. The scum pipe actuator shall be equipped with a torque switch that is responsive to loads encountered in either the opening or closing direction. The torque switch shall operate during the complete scum pipe cycle without the use of auxiliary relays, linkages, latches, or other devices. The torque switch shall be wired to shut off the actuator motor in the event excessive torque is being generated in either direction of travel.

F. The scum pipe actuator shall have a stem nut of high tensile bronze or other material, compatible with the scum pipe stems and suited to the application.

G. Bevel gears are to be direct driven by actuator.

H. A handwheel shall be provided for manual operation. The handwheel shall not rotate during motor operation nor shall a fused motor prevent manual operation. When in manual operation position, the unit remains in this position until motor is energized, at which time the scum pipe operator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. This movement from motor operation to handwheel operation shall be accomplished by a positive declutching knob or level that will disengage the motor and motor gearing mechanically but not electrically. Hand operation must be reasonably fast and require no more than 40 pounds of rim effort at a maximum required torque. It shall not be possible for the unit to be simultaneously in manual and motor operation.

I. The scum pipe control system and motor shall contain all required contactors for 480 volt fused reversing control as controlled from "Local" Skim-Stop-Backskim pushbuttons or a "Remote" control signal. Provide unit with all required integral controls and switch station and two contact limit switch mechanisms.

J. The terminal compartment shall be completely sealed from the rest of the actuator to prevent intrusion of moisture or water from the electrical conduit into the actuator.

2.08 MOTORS

A. Motors shall conform to all applicable requirements of NEMA, ANSI, IEEE, and NEC standards and shall be UL listed for the service specified.

B. Motors provided for the equipment scheduled below shall meet the following requirements. Motors shall not be loaded beyond nominal rating, not including service factor, at any design condition.
   1. Physical Construction:
      a. Copper leads and windings with ball or roller bearings in end brackets of steel or cast iron or aluminum brackets with steel bearing sleeves. Motor leads shall have the same insulation class as the windings.
      b. Rotor bars shall be aluminum. Where installed in NEMA 4X and Class I, Division 1 locations, a 45% non-phosphorous silver copper brazing shall be applied.
      c. Motor shaft shall be high strength steel protected by a bronze shaft sleeve secured to the shaft to prevent rotation. The maximum allowable no-load shaft run-out shall be 0.002-inch.
      d. Motors shall be equipped with grease fittings and automatic grease reliefs. Bearings shall be prelubricated and field regreasable. Openings for addition of grease shall have grease fittings provided.
   2. Mounting: Horizontal.
   3. Enclosure: TEFC Hazardous location meeting the requirements of Class I Division 2.
   4. Efficiency: Premium efficiency as noted in schedule below.
   5. Service Factor: 1.15.
   6. Power requirements: 60 Hz, Three phase, 230/460 volt, factory-wired for 460 volt connection, ±10% voltage variation.
   7. Load type: Constant torque.
   8. NEMA Design: B.
   9. Insulation: Class F.
   10. Nominal operating speed: 1,800 rpm.
   11. If motor horsepower is increased to meet the requirements of this specification, CONTRACTOR is responsible for increasing all wiring, starters, drives, and other electrical components as required by Code, at no additional cost to OWNER.

Equipment	Horsepower	Nominal Speed	Efficiency
SDP-1	1	1,800	75.5%
SDP-2	1	1,800	75.5%
SDP-3	1	1,800	75.5%
SDP-4	1	1,800	75.5%
SDP-5	1	1,800	75.5%
SDP-6	1	1,800	75.5%
SDP-7	1	1,800	75.5%

2.09 SPARE PARTS

A. CONTRACTOR shall provide, along with the shop drawings, a list of the manufacturer's recommended spare parts for the specified equipment. The list shall include a description of each spare part, current pricing, and expected delivery time for each part. No spare parts shall be provided by CONTRACTOR/manufacturer as part of this Contract.

2.10 FINISHES

A. It is the intent of these specifications that equipment, support and accessories be furnished factory shop-primed and finish-painted. Equipment and appurtenances shall be prepared in accordance with commercial grade SSPC specifications No. 6. Priming and finish painting shall be as recommended by manufacturer and shall be suitable for describe if applicable (e.g., corrosive atmosphere, high temperature, outdoor operation). Touchup paint shall be provided by manufacturer.

B. All stainless steel surfaces shall be brush blasted in accordance with SSPC-SP7 before shipment.

2.11 ANCHOR BOLTS

A. Provide all anchor bolts required for equipment furnished. Anchor bolts shall be 316 stainless steel of ample strength for the intended service. Provide anchor bolts in accordance with Division 05.

PART 3–EXECUTION

3.01 GENERAL

A. Refer to requirements specified in Division 01 for equipment installation, quality control, testing, supervision, startup, and operator training. Comply with additional requirements as specified below.

END OF SECTION

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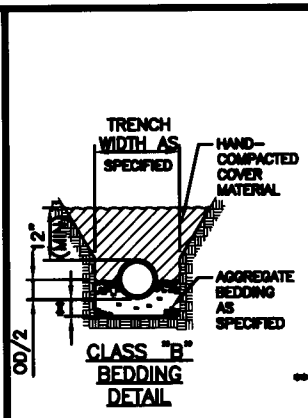
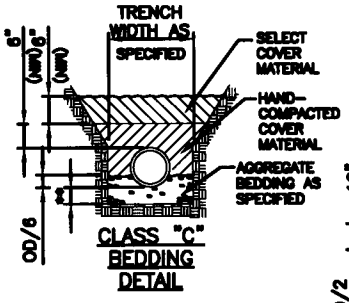
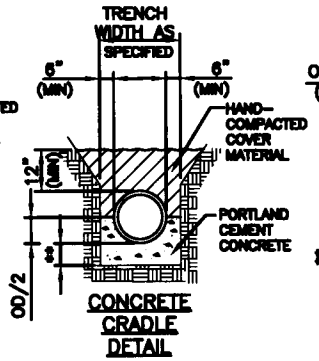
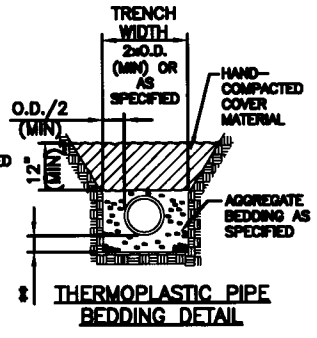
SANITARY SEWER APPURTENANCES

STANDARD DETAIL

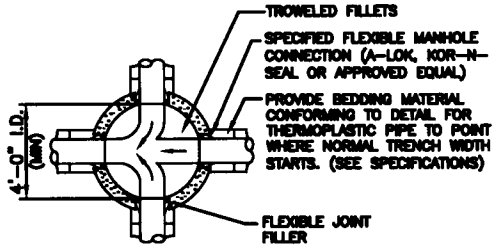


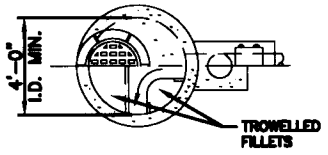


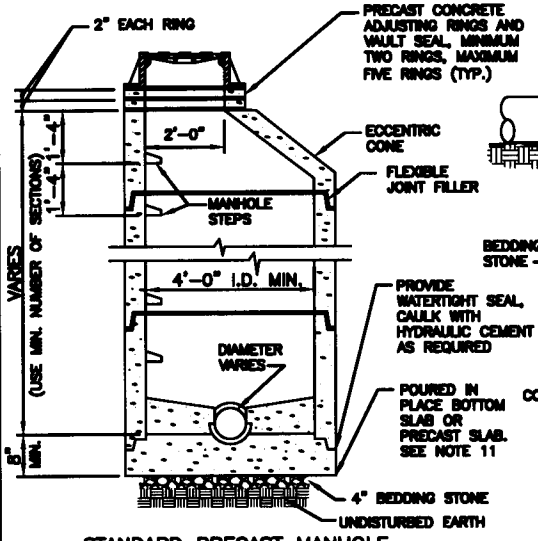


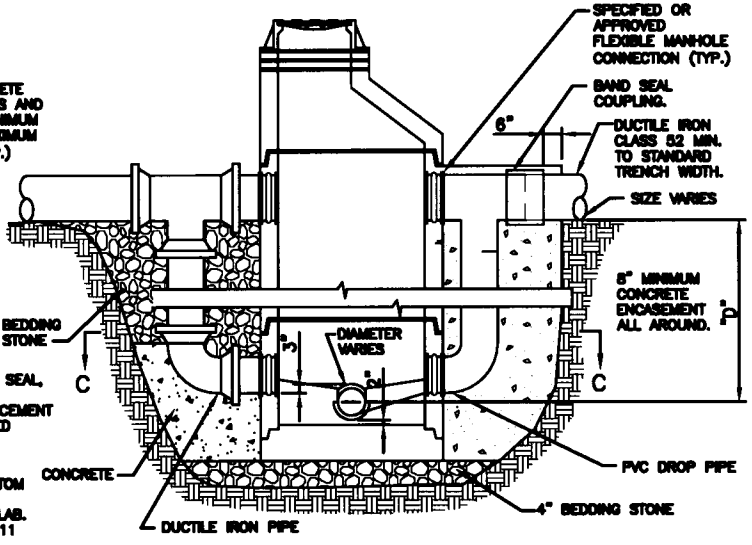


** OUTSIDE DIAMETER/4, 4" MINIMUM.









NOTES

1. DETAILS RELATIVE TO ITEMS SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE SPECIFICATIONS AND THE APPLICABLE SPECIAL PROVISIONS.

2. VARIATIONS IN DIMENSIONS AND DESIGN MAY BE PERMISSIBLE, PROVIDING EQUIVALENT CAPACITY AND STRENGTH ARE ATTAINED.

3. ALL CONCRETE FILLETS SHALL BE HAND TROWELED WITH A 1/4"/FT. SLOPE.

4. INSIDE DIMENSIONS FOR MANHOLES: USE MINIMUM 4' DIAMETER FOR SEWER LESS THAN 18" IN DIAMETER; USE MINIMUM 5' DIAMETER FOR SEWER 18" THRU 24" IN DIAMETER; USE MINIMUM 6' DIAMETER OR MINIMUM 6' SQUARE FOR SEWER OVER 24" IN DIAMETER.

5. BEDDING CLASSES "B" AND "C" SHALL MEET OR EXCEED ASTM C12 REQUIREMENTS.

6. DROP TYPE ENTRANCE TO STANDARD MANHOLE WILL BE PAID FOR SEPARATELY IF SO LISTED IN THE BID.

7. SEE DRAWINGS FOR DROP TYPE ENTRANCES FOR SANITARY SEWERS LARGER THAN 15".

8. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF REGULATORY BODIES OF THE STATE AND APPLICABLE MUNICIPAL ORDINANCES.

9. ALL NEW CONSTRUCTION SHALL BE PLACED ON UNDISTURBED EARTH OR STONE BEDDING.

10. FLAT SLAB TOPS SHALL BE DESIGNED FOR H-20 TRUCK LOADING AND SHALL MEET REQUIREMENTS OF ASTM C-478.

11. BASE SLABS SHALL BE REINFORCED AS FOLLOWS: REINFORCING SHALL BE PLACED IN EACH DIRECTION AT 2" CLEAR FROM TOP SURFACE OF SLAB, REINFORCING SHALL BE GRADE 60. USE OF CAST-IN-PLACE SLAB SHALL NOT RELIEVE CONTRACTOR OF REQUIREMENTS TO PROVIDE WATERTIGHT JOINTS.

INSIDE DIA.	DEPTH	REINF.
4'	≤ 30'	#3@6"
5'	≤ 20'	#3@6"
5'	20'-30'	#4@10"
6'	≤ 20'	#4@10"
6'	20'-25'	#4@6"
6'	25'-30'	#4@6"

12. FLAT SLABS SHALL BE PROVIDED IN SHALLOW DEPTH SITUATIONS IN LIEU OF ECCENTRIC CONES.

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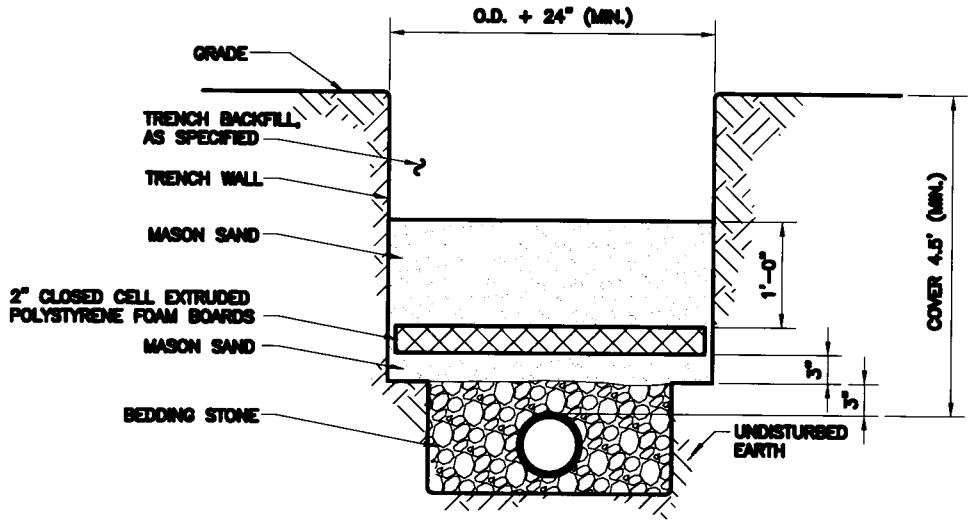
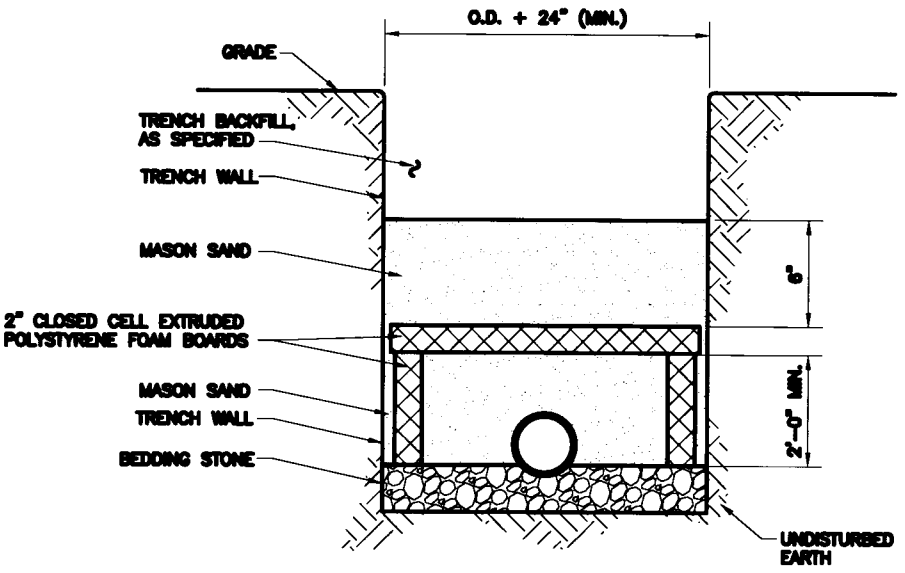
01-975-43A

OCTOBER 2011



FULL WIDTH INSULATION



INVERTED U INSULATION

NOTE: INSULATION REQUIRED ON ALL PIPES HAVING LESS THAN 6-FT OF COVER, AND NO PIPES SHALL BE INSTALLED WITH LESS THAN 5-FT OF COVER

PIPE INSULATION

STANDARD DETAIL

STRAND ASSOCIATES®

01-975-163A

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ADDENDUM NO. 1

WEST HICKMAN WASTEWATER TREATMENT PLANT SCUM REMOVAL ADDITION AND AERATED SLUDGE HOLDING TANK NO. 3 COVER PROJECT

CONTRACT NO. 22-2018

LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT, KENTUCKY

Bids will be received until 2 P.M., local time, April 5, 2018.

This Addendum to the Project Manual is issued to modify, explain, or correct the original Project Manual and is hereby made part of the Contract Documents. Insert the number of this Addendum in the blank space provided in the Bid, page P-3.

A. DIVISION 00–BIDDING AND CONTRACTING REQUIREMENTS

1. PART II–INFORMATION FOR BIDDERS

   a. Page IB-8, CASH ALLOWANCES

   CHANGE "SECTION 02222" to "SECTION 31 23 00."

   CHANGE "SECTION 16940–CONTROLS" to "SECTION 26 09 00–CONTROLS AND INSTRUMENTATION."

2. PART III–FORM OF PROPOSAL

   a. Page P-8, CASH ALLOWANCES

   CHANGE "SECTION 02222" to "SECTION 31 23 00."

   CHANGE "SECTION 16940" TO "SECTION 26 09 00."

B. SPECIFICATIONS

1. DIVISION 09–FINISHES

   a. SECTION 09 88 21–TANK AND CHANNEL LINING SYSTEM

   ADD the attached SECTION 09 88 21.

2. DIVISION 13–SPECIAL STRUCTURES

   a. Page 13 34 23.19-3, SECTION 13 34 23.19–PREFABRICATED ALUMINUM DOME STRUCTURES, PART 2–PRODUCTS, 2.02.A

   CHANGE "6061-T6 aluminum" to "6005A-T6 aluminum" in Paragraph 2.02.A.1.

   CHANGE "minimum of six panels" to "minimum of three panels" in Paragraph 2.02.A.10.

b. Page 13 34 23.16-5, SECTION 13 34 23 PREFABRICATED ALUMINUM [illegible] STRUCTURES, PART 3–EXECUTION, 3.02

ADD the following paragraph:

"D. Manufacturer shall coordinate location and connection of any support required for [illegible] FRP odor control intake pipe."

3. DIVISION 26–ELECTRICAL

a. Page 26 09 00-3, SECTION 26 09 00–CONTROLS AND INSTRUMENTATION, PART 2–PRODUCTS, 2.01

CHANGE Paragraph "2.01 RADAR LEVEL TRANSMITTER" to "[illegible] TRANSMITTER."

ADD PARAGRAPH 2.01 as follows:

"2.01 SCADA SYSTEM MODIFICATIONS

A. The SCADA system shall be modified to [illegible] ASH Tank and the [illegible] include graphic displays [illegible] for ASH [illegible] SDP operators and from the ASH Tank [illegible]

B. SCADA system modifications shall be performed by [illegible] Louisville, Kentucky. [illegible] Bid for SCADA system modifications. The [illegible] Tank level transmitter."

4. DIVISION 35–METALS

a. Page 35 22 25-1, SECTION 35 22 25–SLIDE GATES, PART 2–PRODUCTS, 2.01.A

CHANGE "Fontaine USA of Bedford, New Hampshire" to "Fontaine-Aquatech of Quebec, Canada."

5. DIVISION 40–MECHANICAL

a. Page 40 05 02-2, SECTION 40 05 02–PIPING AND APPURTENANCES, PART 2–PRODUCTS, 2.02.A.10

DELETE Paragraph 2.02.A.10.m in its entirety.

b. Page 40 05 02-5, SECTION 40 05 02–PIPING AND APPURTENANCES, PART 2–PRODUCTS, 2.02.C.1.a

REPLACE "Except as otherwise specified, all chemical [illegible] shall be constructed of PVC with [illegible] chemical solution piping, including [illegible]

c. Page 40 05 02-7, SECTION 40 05 02–PIPING AND APPURTENANCES, PART 2–PRODUCTS, 2.03.C

CHANGE "Telescopic valves shall be as manufactured by Vulcan Industries, Watt Telescopic Valve as manufactured by Latanick Equipment Co., or equal." to "Telescopic valves shall be as manufactured by Vulcan Industries, Watt Telescopic Valve as manufactured by Latanick Equipment Co., RW Gate, or equal."

d. Page 40 05 02-8, SECTION 40 05 02–PIPING AND APPURTENANCES, PART 2–PRODUCTS, 2.04.B

ADD "Material of construction is brass." to the end of the paragraph.

e. Page 40 23 00-5, SECTION 40 23 00–BURIED PIPING AND APPURTENANCES, PART 2–PRODUCTS, 2.05

ADD the following paragraph:

"B. Fire hydrant shall be Waterous W-67 Pacer with 5-inch barrel, compression shutoff, two 4 1/2-inch nozzle with chains and Waterous No. 2 nut. Fire Hydrant shall meet LFUCG Fire Department requirements. Hydrant shall be built for 3-foot 6-inch bury and be painted in accordance with local requirements. About 1/2 cubic yard of coarse gravel shall be placed from the bottom of the trench up to the hydrant barrel. Brace with solid concrete block not concrete. Connect hydrant to auxiliary valve with 2-foot length of pipe. Auxiliary valve shall be gate valve as specified in Section 40 05 02 with cast iron road box as specified in Section 40 23 00. Refer to Drawing 01-975-64A."

f. Page 40 23 00-9, SECTION 40 23 00–BURIED PIPING AND APPURTENANCES, PART 3–EXECUTION, 3.02.E.3

REPLACE the previous table with the table below:

Fluid Abbreviation or Name	Minimum Test Pressure in psi	Test Medium	Leakage Allowance Designation
CLS, SH, SHS, W, PW	150	Water	"A"(1)
SCM	25	Water	"A"

6. DIVISION 46–CHEMICAL EQUIPMENT

a. Page 46 43 21-1, SECTION 46 43 21–SCUM DECANT PIPE, PART 2–PRODUCTS, 2.01.A

CHANGE "Siemens Water Technologies" to "Evoqua Water Technologies."

b. Page 46 43 21-3, SECTION 46 43 21–SCUM DECANT PIPE, PART 2–PRODUCTS, 2.07.A

ADD the following sentence to the end of the paragraph:

"Remote digital control and position indication shall be through DeviceNet communication to PLC-4, located in SCADA panel P4."

7. STANDARD DRAWINGS

ADD the attached Drawing 01-975-64A.

C. DRAWINGS:

1. SHEET NO. 2–LIST OF DRAWINGS, DESIGN CRITERIA AND ABBREVIATIONS, SYMBOLS, ABBREVIATIONS

ADD "W WATER" at end of list.

2. SHEET NO. 7–SITE PIPING PLAN 2 POTABLE WATER TO ODOR CONTROL BUILDING, KEY NOTES

ADD "11. Install new fire hydrant with isolation valve." to new Fire Hydrant [illegible]

3. SHEET NO. 8–SITE ELECTRICAL PLAN, KEY NOTES

ADD "14. Core 3.5-inch conduit with [illegible] Remove [illegible] Remove Trash, Scum, Decant Pipe openings, Remove [illegible] Basement and Pipe Gallery."

CLARIFICATION: to Key Note 4, PLC 4 is located in Pipe Gallery, see Key Note 7.

4. SHEET NO. 12–SCUM DECANT WELL–PLAN AND SECTIONS, SECTION 1

REPLACE "PROVIDE WALL AND CEILING [illegible] CONTRACTOR SHALL [illegible] ABOVE TELESCOPIC VALVE [illegible] COATING SYSTEMS OF ALL WALLS AND CEILING."

5. SHEET NO. 26–ODOR CONTROL BUILDING–ELECTRICAL PLAN

ADD two light fixtures, fixture mark E to the [illegible] will find one fixture located on the east [illegible] wall.

6. SHEET NO. 27–ODOR CONTROL BUILDING–ELECTRICAL SCHEDULES AND DETAILS

ADD the following light fixture schedule:

Fixture Mark	Manufacturer	Model Number	Description	Quantity
A	Holophane	PLED2L 10L 4K T3 UNV NA G L6 F1	Pendant LED [illegible]	8
B	Holophane	WALLGLED 20C 10W 3K T3M 120 SPD AB GY	Wall [illegible] LED [illegible]	2
C	Holophane	GM LED R HO EVA ON T WP L6930	Exit [illegible] LED [illegible]	7
D	Holophane	PLED2L 10L 4K T3 UNV NA G L6 F1	Pendant LED [illegible]	1
E	Holophane	GM30 WL LED	2-lamp LED [illegible] light	2

[illegible]

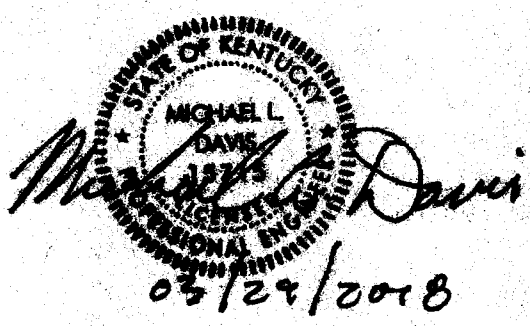
****

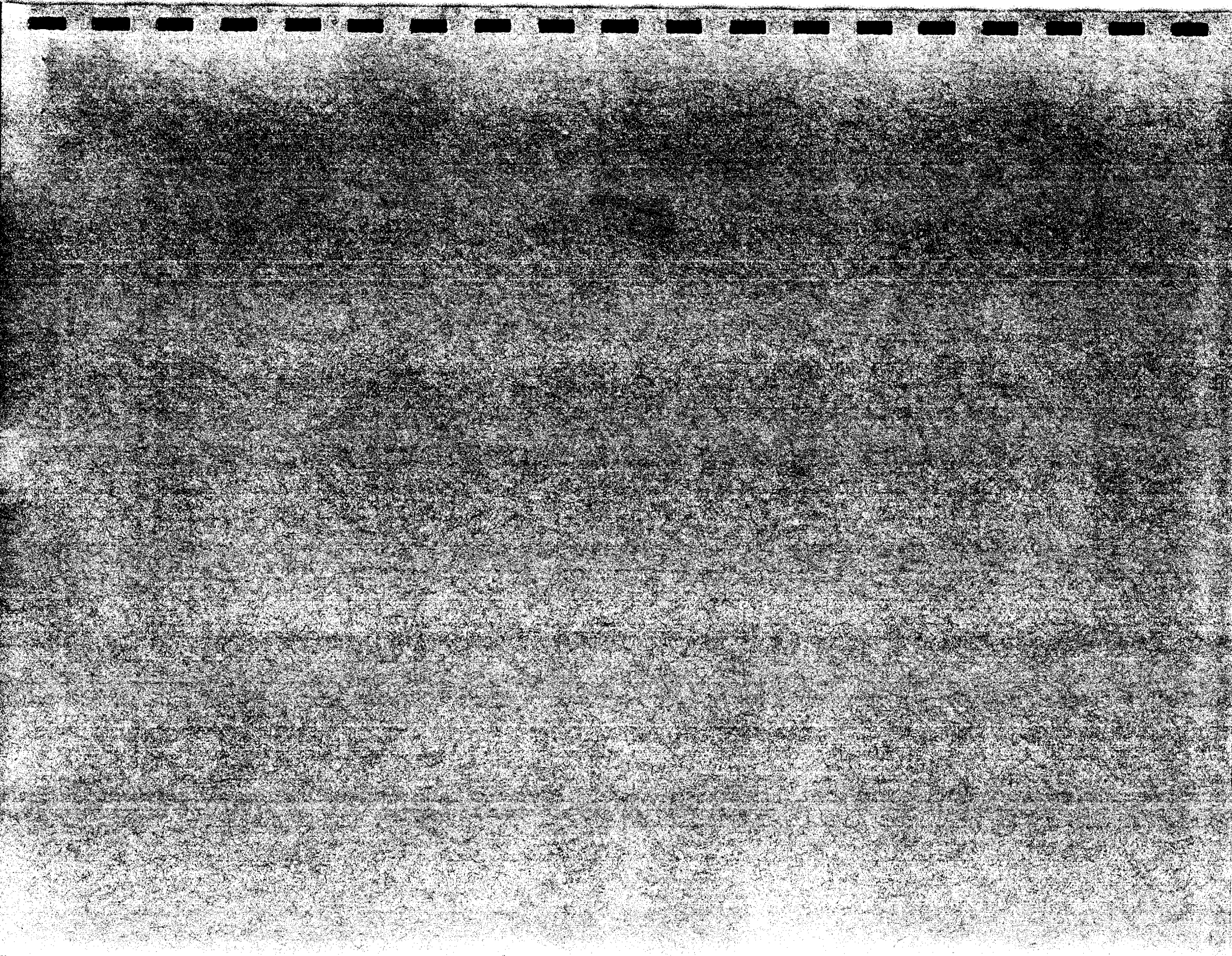
BIDDERS MUST ACKNOWLEDGE RECEIPT OF THIS ADDENDUM IN THE SPACE PROVIDED IN THE BID FORM

****

Dated at Lexington, Kentucky
March 29, 2018

STRAND ASSOCIATES, INC.®
1525 Bull Lea Road, Suite 100
Lexington, KY 40511





SECTION 09 88 21

TANK AND CHANNEL LINING SYSTEM

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Surface preparation and application of tank and channel lining system on walls and ceiling of Scum Decant Well.

1.02 DEFINITIONS

A. DFT: Dry Film Thickness.

1.03 SUBMITTALS

A. Submittals shall be in accordance with provisions of Section 01 33 00–Submittals. Include only two copies of the Material Safety Data Sheet (OSHA Communication Standard).

1.04 PREINSTALLATION MEETING

A. CONTRACTOR shall convene a meeting with ENGINEER, applicator, and material supplier to discuss approved application products, finishes, and curing methods.

1.05 QUALITY ASSURANCE

A. Manufacturer: Company specializing in the manufacture of industrial-grade coatings with a minimum of 15 years of documentable satisfactory experience.

B. Applicator: Product manufacturer shall provide written certification that applicator has been trained in the application of the product. Applicator shall have a minimum of 5 years of satisfactory documented experience in the business of similar coating applications and project size.

C. Single Source: Except as noted, furnish field primers, pretreatments, and thinners by the same manufacturer as finish coats.

D. Prepare and finish sample surfaces for observation by ENGINEER to establish acceptable standards for the work.

1.06 ENVIRONMENTAL CONDITIONS

A. Do not apply coating unless surface and surrounding air temperatures are above 50°F. Concrete surface temperature must be decreasing during time of application.

B. Do not apply product in cold, foggy, damp, or rainy weather.

1.07 WARRANTY

A. Refer to General Conditions.

B. Correction Period: 5 years.

PART 2–PRODUCTS

2.01 APPROVED MANUFACTURERS

A. Raven Lining Systems, 1024 North Lansing Avenue, Tulsa, Oklahoma 45106, (800) 324-2810, (918) 584-2810, fax (918) 582-4311, www.ravenlining.com.

B. Sauereisen, 160 Gamma Drive, Pittsburg, Pennsylvania 15238-2989, fax (412) 963-7620, www.sauereisen.com

C. Tnemec Company, Inc., 6800 Corporate Drive, Kansas City, Missouri 64120-1372, (800) TNEMEC1 [(800) 863-6321], www.tnemec.com.

D. Sherwin Williams Company, www.sherwin-williams.com.

2.02 APPROVED SYSTEMS

A. Raven Lining Systems:
   1. Raven 760 High Performance Polymer Concrete (HPPC).
   2. Raven 405 Ultra High-Build epoxy coating.

B. Sauereisen:
   1. Filler Compound No. 209.
   2. SewerGard No. 210S.

C. Tnemec Company, Inc.
   1. Series 218 Mortarclad resurfacer.
   2. Series 436 Perma-Shield F.R.

D. Sherwin Williams Company:
   1. Duraplate 2300 Waterbased Epoxy Cementitious Resurfacer.
   2. Duraplate 5800 High Build Epoxy.

PART 3–EXECUTION

3.01 GENERAL

A. Provide dry heat and ventilation as needed to obtain the recommended drying conditions.

B. Starting of work shall be construed as acceptance of surfaces and conditions by the applicator.

C. Do not apply product to improperly prepared, wet, or damp surfaces.

D. Material shall not be applied when surfaces are subjected to direct sunlight or when air and surface temperatures are rising.

E. Correct deficiencies in the total film by applying additional coats and in accordance with manufacturer recommendations.

3.02 FIELD QUALITY CONTROL

A. Provide high-low thermometers to verify temperatures and any other instrumentation needed to verify that ambient surface and material conditions are within the recommended application parameters.

B. Thickness:
1. During application, a wet film thickness gauge meeting ASTM D4414–Standard Practice for Measurement of Wet Film Thickness of Organic Coating by Notched Gauges, shall be used to ensure a monolithic coating and uniform thickness during application.
2. Compute gallons required to each coat prior to application based on the square footage to be coated.

3.03 SURFACE PREPARATION

A. General:
1. Examine all surfaces to be coated and the conditions affecting proper performance.
2. Correct unsatisfactory conditions.
3. Perform preparation and cleaning procedures in accordance with manufacturer instructions to obtain a clean and dry surface.

B. Concrete Surfaces: Formed, Trowel Finish, or Flatwork:
1. Allow concrete to cure a minimum of 28 days:
   a. Verify dryness by performing ASTM D4263 "Plastic Film Tape-Down Test."
   b. Surfaces where the opposite side is exposed to earth shall be tested by performing ASTM F1869 "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride." Moisture shall not exceed 3 pounds per 1,000 square feet in a 24-hour period.
2. pH Testing:
   a. Check pH of the concrete surface to verify it is between 10.0 and 13.0.
   b. Check pH a minimum of once for every 1,000 square feet of surface area, with no two tests closer than 50 feet apart.
3. Moisture Testing:
   a. Verify dryness by testing for moisture with an ASTM D 4263 "plastic film tape-down test."
   b. Verify dryness a minimum of once for each of each structure.
4. Moisture Vapor Transmission Testing:
   a. Verify the moisture vapor transmission is less than 3 pounds per 1,000 square feet in a 24-hour period by the ASTM F1869 "Standard test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride."
5. Prepare surfaces by abrasive blasting according to SSPC-SP 13.
   a. Walls shall have large burrs, fins, and form irregularities ground uniformly prior to other preparation.
   b. Abrasive-blast horizontal surfaces to remove laitance, curing compounds, sealers, or other contaminants. The surface shall expose the fine aggregate resembling 60-grit coarse sandpaper.
   c. Abrasive-blast vertical surfaces to open bug holes and remove laitance, form release agents, curing compounds, or other contaminants. The surface shall expose the fine aggregate resembling coarse sandpaper.

6. Allow concrete to cure a minimum of 28 days.
   a. Verify dryness by performing ASTM D4263 "Plastic Film Tape-Down Test."
   b. Surfaces where the opposite side is exposed to earth shall be tested by performing ASTM F1869 "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride." Moisture shall not exceed three pounds per 1,000 square feet in a 24-hour period.

3.04 APPLICATION

A. No application shall be performed until all substrate preparation and testing is complete for the structure being coated.

B. Spray apply the first coat only to areas that can be final coated within the manufacturer's recoat window. If the recoat window is exceeded, the surface shall be prepared according to the manufacturer's recommendations and recoated. Contact the manufacturers for information and times in addition to that provided in their literature.
   1. Raven system:
      a. Fill bug holes and irregularities with Raven 760 HPPC.
      b. Raven does not recommend using a primer.
      c. Thoroughly wash the surfaces prior to application of the first coat and thoroughly wash the first coat surfaces prior to application of the second coat.
      d. Spray apply two coats of 405 at a minimum 100 mils total to concrete fillet, walls, and ceilings.
      e. Raven typically has a maximum 24-hour recoat window at 75°F.
   2. Sauereisen system:
      a. Fill bug holes and irregularities with 209.
      b. Sauereisen does not recommend a primer with 210S.
      c. Spray apply one or two coats of 210S at a minimum 100 total mils total to concrete fillet, walls and ceilings.
      d. Comply with all manufacturer's temperature requirements for material and substrate.
   3. Tnemec system:
      a. Fill bugholes and irregularities with 218.
      b. Spray apply one or two coats of 436 at a minimum 100 total mils to concrete fillet, walls, and ceilings.
   4. Sherwin Williams system:
      a. Fill bugholes and irregularities with 2300.
      b. Primer as required by manufacturer.
      c. Spray apply one or two coats of 5800 at a minimum 100 total mils to concrete fillet, walls, and ceilings.

C. Finish coats shall be applied at a minimum 30 square feet per gallon (50 mils) each coat. Spray apply the first coat only to areas that can be final coated within the manufacturer's recoat window. If the recoat window is exceeded, the surface shall be prepared according to the manufacturer's recommendations and recoated. Contact the manufacturers for information and times in addition to that provided in their literature.
   1. Raven typically has a maximum 24-hour recoat window at 75°F.
   2. The Sauereisen data sheet lists the recoat window at between 4 and 24 hours at 70°F.
   3. The Tnemec data sheet lists the recoat windows to be a minimum of 8 to 24 hours to recoat within 7 days to maximum recoat at 75°F and 10 to 24 hours to recoat with 7 days to maximum recoat at 55°F.

3.05 PROTECTION OF OTHER WORK

A. Protect adjacent surfaces including floors, equipment, or refinished materials by covering with drop cloths or other acceptable means.

B. Maintain safe conditions at all times. Remove solvent-soaked rags and other flammables daily from the area or keep in airtight metal containers.

3.06 INSPECTION AND ACCEPTANCE

A. Immediately repair improperly prepared surfaces, misapplied materials, or inferior workmanship.

B. Touch up or reapply product to surfaces which have been damaged.

C. Holiday Inspection:
   1. After the protective coating has set hard to the touch, it shall be inspected with high-voltage holiday detection equipment. Surfaces shall first be dried; an induced holiday shall then be made on to the coated concrete surface and shall serve to determine the minimum/maximum voltage to be used to test the coating for holidays at that particular area. The spark tester shall be initially set at 100 volts per 1 mil of film thickness applied but may be adjusted as necessary to detect the induced holiday (refer to NACE RPO188-99).
   2. All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper marked or other hand tooling method. After abrading and cleaning, additional protective coating material can be hand applied to the repair area. All touchup/repair procedures shall follow the protective coating manufacturer's recommendations.

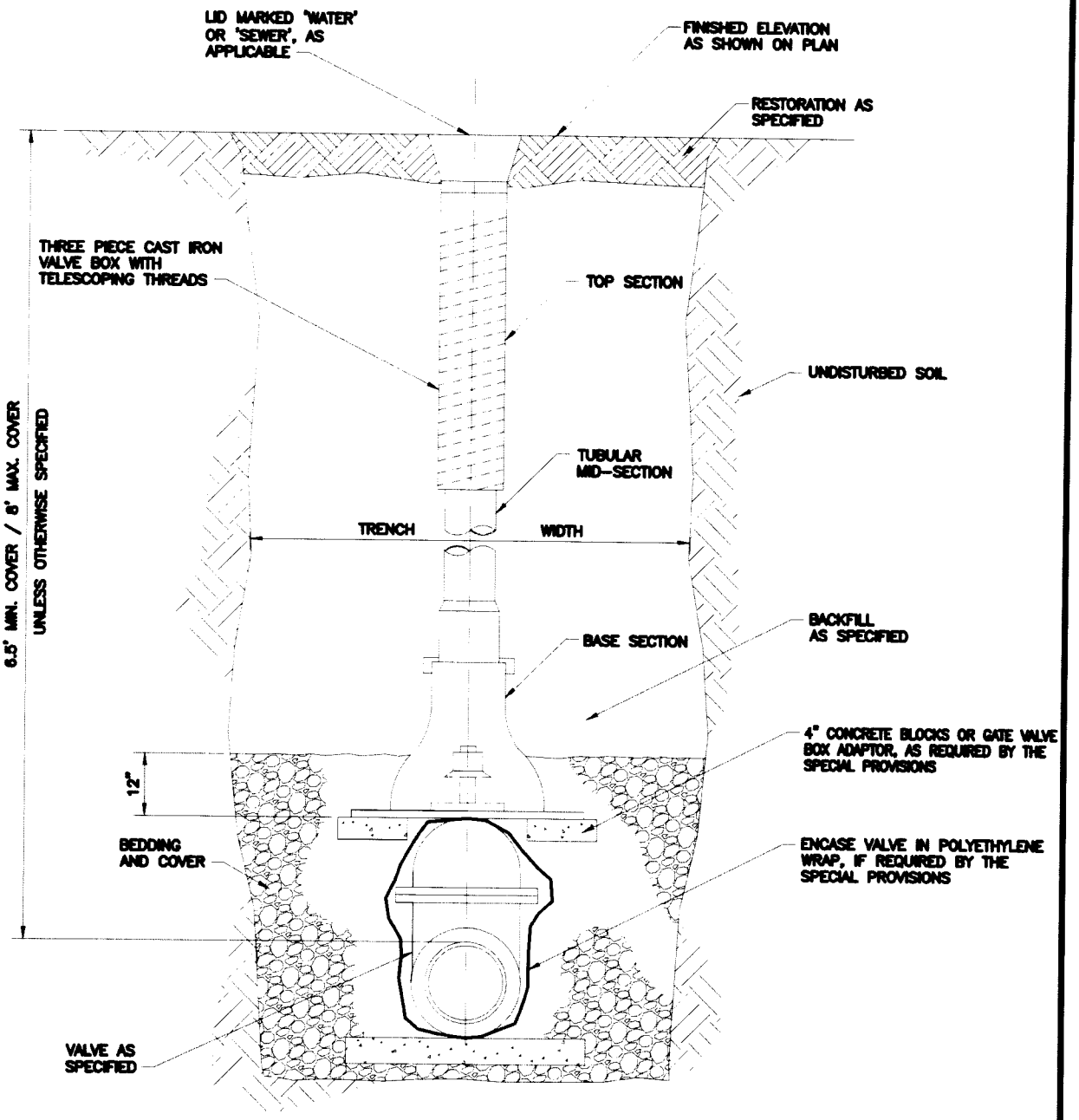
D. Costs of specified tests shall be paid by CONTRACTOR.

E. Costs for any reinspection or retesting due to defective workmanship or materials shall be paid by CONTRACTOR.

3.07 CLEANING

A. Clean all splattered surfaces by methods which will not scratch, mar, or otherwise cause damage to finishes.

END OF SECTION



STANDARD BURIED GATE VALVE BOX SETTING

STANDARD DETAIL

STRAND ASSOCIATES®

01-975-64A

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