Vol 2

SAVANNAH
Public Works & Water Resources

BIDDING, CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS FOR THE CONSTRUCTION OF

TRAVIS FIELD WATER RECLAMATION FACILITY

CIP# SW-524-10

FOR

THE CITY OF SAVANNAH, GEORGIA

MAYOR	EDDIE DeLOACH
CITY MANAGER	ROBERTO HERNANDEZ

GEORGIA REGISTERED No. 26741 PROFESSIONAL ENGINEER FRED SORORIAN

MAY 2019

PREPARED BY:

City of Savannah, GA
and
Thomas & Hutton Engineering Co.
Savannah, GA

BID SET - NOT FOR CONSTRUCTION

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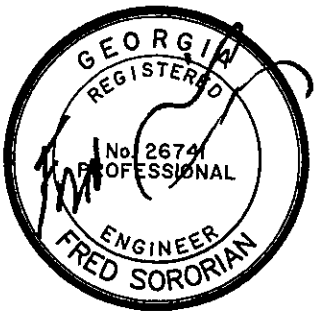

MAY 2019

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BID SET - NOT FOR CONSTRUCTION

PROJECT MANUAL FOR

PROJECT: TRAVIS FIELD WATER RECLAMATION FACILITY
PROJECT NO: SW-524-10

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DIVISION 00 - BIDDING AND CONTRACTUAL REQUIREMENTS

SECTION 00 1050
BIDDER'S CHECKLIST

THIS CHECKLIST **MUST** BE ATTACHED AS THE COVER SHEET TO YOUR BID PRIOR TO SEALING BIDS AND SUBMITTING IT TO THE OFFICE OF THE PURCHASING DIRECTOR. IF THIS CHECKLIST IS NOT ATTACHED, YOUR BID WILL BE DISQUALIFIED. IF THIS CHECKLIST IS INCOMPLETE, OR IF ANY ITEM CANNOT BE VERIFIED AS BEING INCLUDED WITH YOUR BID, YOUR BID WILL BE DISQUALIFIED.

NAME AND ADDRESS _____

_____

EVENT NUMBER _____

PROJECT NUMBER **SW-524-10**

INSTRUCTIONS TO BIDDERS

The contents of your bid package must be clearly marked and submitted **IN THE FOLLOWING ORDER:** 1) Acknowledgment of Addendum, 2) Bid Bond (Section 00 1137), 3) Bid Proposal page (Section 00 1130), 4) Bidder's Qualifications (Section 00 1135), 5) Contractor Affidavit and Agreement (Section 00 1138), 6) Affidavit Verifying Residency Status for City of Savannah Benefit Application (Section 00 1139), 7) Certification Regarding Debarment, Suspension, etc. (Section 00 1150) and 8) Hire Savannah Agreement (Section 00 1305). In addition, a separate sealed envelope must be submitted with your bid which contains the Disadvantaged Business Enterprise Provisions (Section 00 1310). A second sealed envelope marked "Bidder's Qualifications" must also be submitted. Please place a check mark in the appropriate spaces.

1) Addenda received and included in bid price? ___ Yes ___ No

Indicate number of addenda received: _____

2) Executed Bid Bond enclosed? ___ Yes ___ No

Form of bid bond: ____Surety Company ____ Cashier's Check ____ Certified Check

3) Are all signature pages of the Bid Proposal signed?

___ Yes ___ No

4) Are all signature pages of the Bidder's Qualifications signed?

___ Yes ___ No

5) For Projects under $100,000, are all pages of the Bidder's Questionnaire executed?

___ Yes ___ No

6) The contractor, or any subcontractor, submitting a bid for utility contracting, as defined in O.C.G.A. Section 43-14-2 to a utility system as defined in said section, shall conform to O.C.G.A. Section 43-14-8.2 et seq. with reference to Utility Contractor's Licenses. Utility contracting means a proposal to perform utility work, to a utility system as defined in O.C.G.A. Section 43-14-2(17).

7) The contractor shall submit with their bid, in a separate sealed envelope, documents required in Sections 00 1310 Disadvantaged Business Enterprises Provisions. Such envelope shall be clearly marked with the bid number, project name and number and marked "Section 00 1310 Disadvantaged Business Enterprise Provisions."

8) Debarment and Suspension Requirements: The Contractor agrees to provide certification that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded by any Federal department or agency pursuant to the regulations implementing Executive Order 12549, 29 CFR Part 98, Section 98.510. The contractor shall submit with their bid the certification in Section 00 1150, Debarment and Suspension Requirements.

I certify that the above items were included with the attached bid at the time submitted to the Purchasing Director.

_____ _____

Signature of Contractor Date

_____

Title

Section 00 1100

INVITATION TO BID

Sealed proposals for **Travis Field Water Reclamation Facility (SW-524-10)** will be received by the City of Savannah in the office of the Purchasing Director, second floor, Traub Room, 301 West Oglethorpe Avenue, Savannah, GA 31401, until 1:30PM EST on Tuesday, **July 2, 2019**. The names of the respondents will be read aloud at 1:30PM EST of the same day and no further bids will be accepted. The Disadvantaged Business Enterprises Provisions will be evaluated and those bids found to be in compliance with the DBE Provisions shall be opened and read aloud at 1:30 PM on **July 9, 2019**. Bidders' attention is directed to Section 00 1110, paragraph 8, Receipt of Bids, which describes this process in detail.

The work to be done consists of the following generally described items:

> Construction of a new 4.0 MGD Wastewater Reclamation Facility (WRF) at the site of the existing Travis Field WRF (198 Darque Road, Savannah GA 31408). The proposed treatment facility will include: elevated headworks with drum screens and vortex grit removal system; a 1.9 million gallon above-ground pre-stressed concrete equalization tank; a 5-stage membrane bio-reactor; drain pump station; chemical feed system; UV disinfection system; oxygen injection system; plant reuse water system; effluent pumping station; aerobic digestion, membrane thickeners, thickened sludge pump; diesel-powered stand-by generators; SCADA monitoring and control system; meters, samplers and instrumentation; electrical, controls, and other ancillary systems. Also included is an administration building (control room, office, laboratory, pump room, misc. employee facilities & equipment spaces); site work (clearing, demolition of existing facility, grading, pile and slab foundations, storm drainage, paving, water utilities, repair of existing effluent force main). Contractor shall install a 2.0-meter belt filter press provided by the City with controls (polymer system not included by City). The existing facility includes a City of Savannah lift station that must remain in operation and be upgraded to serve as facility influent lift station, however the remainder of the facility is not operational, thus plant bypassing will not be required during construction.

Plans, specifications and contract documents are available from the designated reprographic company at contractor's expense. Contractors may request to purchase those documents by visiting the City's website at http://www.savannahga.gov/index.aspx?NID=592 and clicking on Construction Bids and Plan holder's List tab to enter the reprographics company's website. You must register on the reprographics company's website to view plans, specs and plan holder's list.

In an effort to ensure that all segments of the business community have access to information, a Contractor's Drawing Room has been established. Plans and specifications are on file and may be examined at the Savannah Entrepreneurial Center, 801 E. Gwinnett Street (corner of Paulsen and Gwinnett) (912) 652-3582.

All bidders are encouraged to attend a **pre-bid conference** which will be held at **10:00 AM EST** on **Wednesday, May 29, 2019** in the **City Hall 2nd floor Media Room,** located at City Hall, 2 E Bay Street, Savannah, GA 31401. Project scheduling, coordination requirements, minority participation, and questions of interpretation will be addressed at this time.

Bids must be accompanied by a Bid Bond on the form included hereto and shall be secured by a surety company, certified check or cashier's check in an amount equal to at least 5% of the amount of the bid. A contract performance and payment bond each in the amount of 100% of the contract amount will be required of the successful bidder.

PAYMENT AND PERFORMANCE BONDS MAY BE WAIVED FOR A CONTRACT AWARDED UNDER $100,000.

THE BID BOND FOR THIS CONTRACT WILL NOT BE WAIVED.

All bids must be made and all work performed as provided in Section 00 1300, City Labor Standards, and Section 00

1330 of the Federal Labor Standards Provisions as to employment of Savannah labor.

This is a bid for construction and therefore the City's local vendor preference ordinance will not apply.

Contractors and subcontractors shall have all necessary licenses and shall furnish such license numbers before entering into contracts with the Mayor and Aldermen of the City of Savannah.

The City of Savannah reserves the right to reject any and all bids and to waive any informalities in the bidding.

Bidders must comply with the President's Executive Order Nos. 11246 and 11375 which prohibit discrimination in employment regarding race, creed, color, sex or national origin.

Bidders must comply with Section 2-4078 of the City Code regarding wage rates, Title VI of the Civil Rights Act of 1964, the **Davis-Bacon Act**, the Anti-Kickback Act, and the Contract Work Hours Standard Act.

Bidders are cautioned as follows: By signing this bid or offer, the Bidder will be deemed to have signed and agreed to the provisions of the "Certification of Non-Segregated Facilities" in this solicitation. The "Certification" provides that the bidder does not maintain or provide for his employee's facilities which are segregated on a basis of race, creed, color, or national origin, whether such facilities are segregated by directive or on a defacto basis. The Certification also provides that he will not maintain such segregated facilities. Failure of a bidder to agree to the Certification of Non-Segregated Facilities will render his bid or offer non-responsive to the terms of solicitations.

The City of Savannah actively encourages minority employment and minority participation in all its capital improvement projects. The Bidder shall comply with Section 00 1310, Disadvantaged Business Enterprises Provisions, which requires the Bidder to submit documentation of compliance with these provisions in a separate sealed envelope with their bid. Further attention is called to contract conditions contained herein pertaining to non-discrimination, equal employment opportunity, subcontract and opportunities for project area residents.

The OVERALL DBE GOAL: 20%
The LOCAL DBE GOAL: 10%

The contractor, or any subcontractor, submitting a bid for utility contracting, as defined in O.C.G.A. Section 43-14-2 to a utility system as defined in said section, shall conform to O.C.G.A. Section 43-14-8.2 et seq. with reference to Utility Contractor's Licenses. Utility contracting means a proposal to perform utility work to a utility system as defined in O.C.G.A. Section 43-14-2(17).

A Utility Contractor's License will be required for this project.

Bids shall be submitted in two separate sealed envelopes. One envelope shall contain the Disadvantaged Business Enterprises Provisions and shall be clearly marked with the Project Name, Bid Number and Section 00 1310 Disadvantaged Business Enterprises Provisions. The other sealed envelope shall contain all other bid requirements and shall be clearly marked with the Project Name and Bid Number. The envelope containing the Disadvantaged Business Enterprises provisions shall be attached to the outside of the bid envelope and delivered to:

PURCHASING DIRECTOR
2nd Floor, Traub Room
301 West Oglethorpe Avenue
Savannah, GA 31401

Mark the outside of the envelope as follows:

PROJECT NAME: Travis Field Water Reclamation Facility
CIP NUMBER: SW-524-10
EVENT NUMBER: 7169

SECTION 00 1110
INSTRUCTION TO BIDDERS

1. EXPLANATION TO BIDDERS - Any explanation regarding the meaning or interpretation of contract documents must be requested in writing, with sufficient allowance of time for receipt of reply before the time of the bid opening. Any such explanations or interpretations shall be made in the form of addenda to the documents and shall be furnished to all bidders, who shall acknowledge receipt of all addenda with their bids. Oral explanations and interpretations made prior to the bid opening shall not be binding.

2. BIDDERS' UNDERSTANDING - Bidders should visit the work site to ascertain by inspection pertinent local conditions such as location, character and accessibility of the site, availability of facilities, location and character of existing work within or adjacent thereto and labor conditions. The Owner shall make available to all prospective bidders, previous to the receipt of bids, information that it may have as to sub-soil conditions and surface topography at the work site. Such information shall be given as the best factual information available without being considered as a representation of the Owner.

3. PRE-BID CONFERENCE - In order to assist bidders in the preparation of their bids, a pre-bid conference will be held at City Hall 2nd Floor Media Room at the date and time specified in the Invitation to Bid. During this conference, the meaning and intent of the Contract Documents will be discussed and any new information that may change the scope of the contract or add clarification to the contract will be answered by Addenda, mailed or delivered to all parties recorded as having received the Bidding Documents.

4. BID REQUIREMENTS - Security, equal to 5% of the amount bid, shall be submitted with the Proposal. Failure to submit same shall be cause for rejection. Only the form provided herein will be accepted. NO OTHER FORM WILL BE ACCEPTED. The bidder, at his option, shall furnish either a certified check, cashier's check or bid bond as security. Bid bonds shall be issued from a company licensed to do business in Georgia and shall be signed or countersigned by a Georgia resident agent and shall have a proper Power of Attorney evidencing the authority of the individual signing the bond. Security deposited by unsuccessful bidders will be returned as soon as practical after the bid opening.

5. PREPARATION OF BIDS:
   A. Bids shall be submitted on the forms provided herein. NO OTHER FORM WILL BE ACCEPTED. These forms must be signed by the bidder or his authorized representative. Any corrections to entries made on bid forms should be initialized by the person signing the bid. Bidders must complete and submit the Bidder's Qualification Sheet and Bidder's Questionnaire.
   B. The bid response must include the following documents in this order:
      - Bid Proposal Form (as a cover sheet)
      - Exception Sheet
      - Other submittals as stated

      All referenced documents must be completed and returned in their entirety to constitute a complete bid.
   C. Bidders must quote on all items appearing on bid forms, unless specific directions in the advertisement, on the bid form, or in the special specifications allow for partial bids. Failure to quote on all items may disqualify the bid at election of the Owner. When quotations on all items are not required, bidders shall insert the words "no bid" where appropriate.
   D. Alternative bids will not be considered unless specifically called for.
   E. Unless otherwise specified, facsimile bids will not be considered. Modifications to bids already submitted will be allowed if submitted and received prior to the time fixed in the Invitation to Bid. Modifications shall be submitted as such, and shall not reveal the total amount of either the original or revised bids. Bid bonds will not be accepted via facsimile.

F. Bidders are advised that the City of Savannah is intent on completing the construction of this project in a timely and orderly manner to minimize inconvenience to the public and to reduce the cost to the City for inspection and administrative expense. The provisions of Section 00 1500-79 of the General Conditions pertaining to the completion of the work and liquidated damages will be strictly enforced.
G. To submit pricing electronically for this event, enter pricing for each line item shown under the lines tab on the event summary. To enter pricing manually, complete the bid proposal form. Bids must be submitted on the bid proposal forms in order to be considered.
H. The vendor is responsible for determining and acknowledging any addenda issued in connection with this bid solicitation. All addenda issued for this event must be acknowledged in order for a bid to be considered.
I. To be awarded bids, vendors must be registered as suppliers on the City of Savannah's website at www.savannahga.gov.
J. This contract will be awarded to the vendor offering the lowest net price to the City, and meeting or exceeding all specifications herein.

6. INTERPRETATIONS:
   A. Each Bidder shall carefully examine the Contract Documents and all addenda or other revisions and thoroughly familiarize themselves with the detailed requirements prior to submitting a Proposal. Should a Bidder find discrepancies or ambiguities in, or omissions from Bidding Documents, or should the Bidder be in doubt as to their meaning, the Bidder shall at once, and, in any event not later than four (4) days prior to bid date, notify the Project Manager/Project Engineer who will send written addenda to all Bidders. The Project Manager/Project Engineer will not be responsible for any oral instructions. All addenda sent to Bidders will become a part of the Contract Documents. No allowance will be made after bids are received for oversight by the Bidder.
   B. Where a discrepancy occurs between the prices quoted in words and/or numbers, the lowest figure quoted shall take precedence and govern in determining final costs or award of contract.

7. SUBMISSION OF BIDS - Bids must be submitted as directed in the Invitation to Bid.

8. RECEIPT OF BIDS – Bids shall be submitted in two separate sealed envelopes. One envelope shall contain the Disadvantaged Business Enterprises Provisions and shall be clearly marked with the Project Name, Bid Number and "Section 00 1310 Disadvantaged Business Enterprises Provisions." The other sealed envelope shall contain all other bid requirements and shall be clearly marked with the Project Name and Bid Number. The envelope containing the Disadvantaged Business Enterprises Provisions shall be attached to the outside of the bid envelope. Bids received after the time so indicated shall be returned unopened.

   Only the names of the respondents shall be read aloud at the time indicated for receipt of bids in the Invitation to Bid. Prior to the public opening and reading of bids, the Disadvantaged Business Enterprises Provisions shall be opened and evaluated. Bids shall be retained unopened in the Purchasing Department until the Disadvantaged Business Enterprises Provisions have been evaluated. Bidders deemed to not have met the requirements of the Disadvantaged Business Enterprises shall be notified twenty-four hours prior to bid opening that their documentation has not been accepted. Should the Bidder believe that this determination has been made in error, he should appeal the ruling in writing the City's Purchasing Director. The documentation shall then be reviewed by the City Manager or his designee and a final determination made. No appeals shall be considered after the date and time specified for the public opening and reading of the bids.

   Those bids meeting the requirements of the Disadvantaged Business Enterprises Provisions shall be publicly opened and read aloud on the date specified in the Invitation to Bid.

9. WITHDRAWAL OF BIDS - Bids may be withdrawn at any time prior to opening upon written or facsimile request of the Bidder. Withdrawal of bids shall be in accordance with Section 2-4061 of the Code of the City of Savannah. Negligence on the part of the Bidder in the preparation of their proposal shall not be grounds for modification or withdrawal of a proposal after the time set for bid opening.

10. PRESENCE OF BIDDERS AT OPENINGS - At the time and place fixed for opening bids, the content of all bids will be made public for the information of all bidders and other interested parties, who may be present in person or by representative.

11. BIDDERS INTERESTED IN MORE THAN ONE BID - If more than one bid is offered by one party, or by a person or persons representing a party, all such bids shall be rejected. A party who has quoted prices to a Bidder is not thereby disqualified from quoting prices to other Bidders, or from submitting a direct bid on their behalf.

12. ONE BID RECEIVED - In the event only one bid is received, the bid will be kept by the Owner. The contract or commodity will then be re-advertised and additional bids will be solicited. Under no circumstances shall a Bidder who has filed a request to withdraw a bid be permitted to resubmit a bid for the work. If on the new bid date, again only one bid is received, it will be opened, analyzed, and, if approved by the Mayor and Aldermen, awarded.

13. REJECTION OF BIDS - The Owner reserves the right to reject any and all bids.

14. AWARD OF CONTRACT:
    A. If a contract is to be awarded, it will be awarded to the lowest responsible bidder whose evaluation by Owner indicates to the Owner that the award will be in the best interest of the City. This is a bid for construction and, therefore, the City's local vendor preference ordinance will not apply.
    B. The City reserves the right to award separate contracts based on cost savings as reflected in the bid prices for various divisions of the work.
    C. In case of error in the extension of prices, the unit bid prices shall govern. The Owner reserves the right to waive any informality in evaluating bids.
    D. Business Opportunities: All factors being equal, including price, it is the City's policy to give preference in awarding contracts in the following order or priority:
        1) Business concerns located in or owned in substantial part by residents of the target area. The definition of target area is the planning unit in which the work is being performed.
        2) Business concerns located in or owned in substantial part by residents of the project area. Project area is defined as the corporate limits of the City of Savannah.
    E. For Federally Funded Projects, the Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs and the Contract Analyst of the City of Savannah within ten (10) working days of awards of any construction subcontract in excess of $10,000 at any time for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor, employer identification number, estimated dollar amount of the subcontract, estimated starting and completion dates of the subcontract, and the geographical area in which the contract is to be performed.
    F. The award of the contract will be made by the Mayor and Aldermen of the City of Savannah. Following such approval, the contractor will be issued a Notice of Acceptance of the Bid Proposal.

15. CONTRACT, BONDS, AND INSURANCE:
    A. The bidder(s) to whom award is made shall enter into a written contract with the Owner within the time specified in the Proposal.

B. Performance and payment bonds shall be furnished at the time of signing the formal agreement. These bonds must be in the form provided herein. NO OTHER FORM WILL BE ACCEPTED. These bonds shall be issued from a company licensed to do business in Georgia and shall be signed or countersigned by a Georgia agent and shall have a proper Power of Attorney evidencing the authority of the individual signing the bond. These bonds shall each be in an amount equal to the Contract amount.
C. The Contractor shall secure and maintain such insurance policies as are required. Insurance shall be in accordance with the General Conditions attached hereto.

16. PROPOSALS:
A. Proposals containing reservations, conditions, omissions, unexplained erasures or alterations, items not required in the Bid, or irregularities of any kind, may be rejected by the Owner as being incomplete and not qualified for consideration.
B. Each Proposal shall indicate the full business name and address of the Bidder, and shall be signed by the Bidder with the usual signature. It shall also set forth the type of business organization, i.e., corporation, partnership, individual owner.
C. A Proposal submitted by a partnership shall list the names of all partners and shall be signed in the partnership name by one or more members of the partnership. If there is no partner who is a Georgia resident, the name and address of an entity designated to receive service of process for the partnership in Georgia must be provided.
D. A Proposal submitted by a Corporation shall be signed by the legal name of the Corporation, followed by the state of incorporation and the title designation of the Corporation in legal matters. The name of each person signing the Proposal shall be typed or printed below the signature. If not a Georgia Corporation, there must also be evidence that the corporation is licensed to do business in Georgia.
E. A Proposal from an individual who is not a Georgia resident shall provide the name and address of an entity in Georgia with the authority to accept service of process for the individual.

17. POWER OF ATTORNEY - A Power of Attorney, or other satisfactory evidence of the authority of the officer signing in behalf of the Corporation, shall be furnished for the Owner's records.

18. EMPLOYMENT ELIGIBITY VERIFICATION - Pursuant to the "Georgia Security and Immigration Compliance Act of 2006," O.C.G.A. Section 13-10-91, public employers and their contractors and subcontractors are required to verify the work eligibility of all newly hired employees through an electronic federal work authorization program. The Georgia Department of Labor has added a new Chapter 300-10-1, entitled "Public Employers, Their Contractors and Subcontractors Required to Verify New Employee Work Eligibility Through a Federal Work Authorization Program," to the Rules and Regulations of the State of Georgia. (See website: http://www.dol.state.ga.us/pdf/rules/300101.pdf.) The new rules designate the "Employment Eligibility Verification (EEV) Basic Pilot Program" operated by the U.S. Citizenship and Immigration Services Bureau of the U.S. Department of Homeland Security as the electronic federal work authorization program to be utilized for these purposes. The EEV/Basic Pilot Program can be accessed at: https://e-verify.uscis.gov/enroll/. Bidders shall comply with this new rule, and must submit with their bid Section 00 1138 "Contractor Affidavit and Agreement." After the contract has been awarded, the Contractor shall secure from all subcontractors Section 00 1231 "Subcontractor Affidavit and Agreement" which must be submitted to the Contract Analyst of the City of Savannah prior to the subcontractor beginning work at the site.

19. SYSTEMATIC ALIEN VERIFICATION FOR ENTITLEMENTS (SAVE) PROGRAM - O.C.G.A. § 50-36-1, et seq., requires Georgia's cities to comply with the federal **Systematic Alien Verification for Entitlements (SAVE) Program**. SAVE is a federal program used to verify that applicants for certain "public benefits" are legally present in the United States. Contracts with the City are considered "public

benefits." Bidders must comply with this new rule and therefore will be required to provide Section 00 1139 "Affidavit Verifying Residency Status for City of Savannah Benefit Application" with their bid. Note that bidders who are not citizens of the United States will be required to provide their Alien Registration Number on the Section 00 1139 Affidavit.

20. DISADVANTAGED EMPLOYMENT - The City of Savannah actively encourages disadvantaged business enterprises (DBEs) in all of its capital improvement projects. It is the policy of the City of Savannah that DBEs have the maximum feasible opportunity to participate in the performance of construction contracts and that City construction contractors utilize DBE subcontractors to the fullest extent consistent with the efficient performance of the contract.

    Bidders shall comply with Section 00 1310, Disadvantaged Business Enterprises Provisions, which requires the Bidder to submit documentation of compliance with these provisions in a separate sealed envelope with their bid.

    Further Bidder's attention is called to contract conditions contained herein pertaining to non-discrimination, equal employment opportunity, subcontractors and opportunities for project area residents.

21. WAGE RATE - Wage Decision No. GA180089 and GA180129 is assigned to this project. The wage rates included in this project manual shall apply for all construction under this contract.

    (The following contains the wage rates applicable to this project.)

TRAVIS FIELD WATER RECLAMATION FACILTY
SW-524-10

General Decision Number: GA180089 01/05/2018 GA89

Superseded General Decision Number: GA20170089

State: Georgia

Construction Type: Heavy

Heavy Construction, Includes Water and Sewer Lines, and Heavy Construction on Treatment Plant Sites and Industrial Sites (Refineries, Power Plants, Chemical and Manufacturing Plants, Paper Mills, Etc.)

Counties: Bryan, Chatham and Effingham Counties in Georgia.

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.35 for calendar year 2018 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.35 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2018. The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set

forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/05/2018

* ELEC0508-002 09/01/2017

	Rates	Fringes
ELECTRICIAN	$ 25.37	11.41

ENGI0474-025 07/01/2017

	Rates	Fringes
POWER EQUIPMENT OPERATOR: Mechanic	$ 26.85	13.83

PLUM0188-006 08/01/2016

	Rates	Fringes
PIPEFITTER	$ 26.40	14.05

SUGA2012-107 08/11/2012

	Rates	Fringes
CARPENTER (Form Work Only)	$ 15.44	0.00
CARPENTER, Excludes Form Work	$ 14.76	0.00
CEMENT MASON/CONCRETE FINISHER	$ 16.96	0.00
IRONWORKER, REINFORCING	$ 13.30	1.66
LABORER: Common or General	$ 11.96	1.16
LABORER: Pipelayer	$ 15.50	0.00
OPERATOR: Backhoe/Excavator/Trackhoe	$ 16.88	1.30
OPERATOR: Bulldozer	$ 18.36	4.57
OPERATOR: Crane	$ 20.29	1.60
OPERATOR: Grader/Blade	$ 20.24	0.00
OPERATOR: Loader	$ 13.21	0.00
OPERATOR: Piledriver	$ 18.72	2.06
OPERATOR: Roller	$ 12.04	0.69
PILEDRIVERMAN	$ 18.50	0.78
TRUCK DRIVER: Dump Truck	$ 12.79	0.00

TRUCK DRIVER: Lowboy Truck.....$ 17.28 1.84

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

==========

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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

Union Rate Identifiers

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

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

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example:

SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

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

Union Average Rate Identifiers

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

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

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.

Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

==========

END OF GENERAL DECISION

General Decision Number: GA180129 01/05/2018 GA129

Superseded General Decision Number: GA20170129

State: Georgia

Construction Type: Building

County: Chatham County in Georgia.

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.35 for calendar year 2018 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.35 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2018. The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/05/2018

BOIL0026-001 01/01/2013

	Rates	Fringes
BOILERMAKER	$ 24.91	19.69

ENGI0474-002 07/01/2017

	Rates	Fringes
POWER EQUIPMENT OPERATOR:		
Bobcat/Skid Steer/Skid Loader, Bulldozer, Forklift (under 15 tons), and Loader	$ 25.02	13.83
Crane (over 10 tons) and Forklift (15 tons and over)	$ 26.85	13.83
Crane (over 120 tons)	$ 27.85	13.83
Crane (over 250 tons)	$ 28.85	13.83
Oiler	$ 22.68	13.83

PLUM0188-001 08/01/2016

	Rates	Fringes
PIPEFITTER	$ 26.40	14.05
PLUMBER (Including HVAC Pipe Installation)	$ 26.40	14.05

SFGA0669-001 04/01/2017

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers)	$ 28.54	15.84

* SHEE0085-002 07/01/2017

	Rates	Fringes
SHEET METAL WORKER (Excluding HVAC Duct and Metal Roof Installation)	$ 29.78	12.31

SUGA2012-036 08/11/2012

	Rates	Fringes
BRICKLAYER	$ 16.00	0.00
CARPENTER	$ 18.50	0.35
CEMENT MASON/CONCRETE FINISHER	$ 15.90	2.66
ELECTRICIAN (Low Voltage Wiring)	$ 18.00	1.67
ELECTRICIAN, Excludes Low Voltage Wiring	$ 19.95	5.56
GLAZIER	$ 16.42	2.00
IRONWORKER, REINFORCING	$ 20.48	8.41
IRONWORKER, STRUCTURAL	$ 21.00	0.00
LABORER: Common or General	$ 11.81	1.15
LABORER: Mason Tender - Brick	$ 9.00	0.00

LABORER: Pipelayer	$ 12.00	0.23
LABORER: Plaster Tender	$ 11.00	0.00
OPERATOR: Backhoe/Excavator	$ 12.00	0.46
OPERATOR: Grader/Blade	$ 17.52	0.00
PAINTER: Brush, Roller and Spray	$ 16.00	1.62
PLASTERER	$ 16.00	0.00
ROOFER, Excludes Installation of Metal Roofs	$ 11.38	0.00
SHEET METAL WORKER (HVAC Duct Installation Only)	$ 16.88	2.53
SHEET METAL WORKER (Metal Roofs Installation)	$ 15.56	0.00
TILE FINISHER	$ 10.31	0.00
TILE SETTER	$ 14.00	0.54
TRUCK DRIVER: Dump Truck	$ 13.61	0.00
TRUCK DRIVER: Lowboy Truck	$ 17.41	0.00

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area

covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

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

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

Survey Rate Identifiers

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Branch of Construction Wage Determinations
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2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

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U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

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END OF GENERAL DECISION

Section 00 1120

EXECUTION OF CONTRACT DOCUMENTS

To: All Bidders

Having to return contract documents to consultants/contractors due to errors or missing information, results in additional staff time and delays in initiating projects. To eliminate these problems, we have prepared the following checklist:

Bid Proposal

1. Complete the Bidder's Checklist, Section 00 1050; Bid Proposal, Section 00 1130; Bidders Qualifications, Section 00 1135; Form of Bid Bond, Section 00 1137; Contractor Affidavit and Agreement, Section 00 1138; Affidavit Verifying Residency Status for City of Savannah Benefit Application, Section 00 1139, Debarment and Suspension Requirements, Section 00 1150; Hire Savannah Agreement, Section 00 1305, and Disadvantaged Business Employment Provisions, Section 00 1310. Note: No page is to be left blank. Use forms enclosed only.

Contract Documents

2. Execute, (**but do not date**) the Agreement, Section 00 1200.

3. Execute, (**but do not date**) the Performance and Payment Bonds, Sections 00 1205 and 00 1210. Execute Section 00 1215, Bond Affidavit. Please note that the Bonds and Affidavit must be signed by an agent registered in the State of Georgia and Agent's license number must be provided. Use forms enclosed only. The AIA Form is not acceptable.

4. Provide a Certificate of Insurance, Section 00 1220, in accordance with the limits of insurance contained in the General Conditions, Section 00 1500-8. The Certificate should refer to a specific project, including project number, and should make reference to the owner, Mayor and Aldermen of the City of Savannah.

5. Complete the Contractor's and Subcontractor's Certificate concerning Labor Standards and Prevailing Wage Requirements, Section 00 1225 and 00 1230, as appropriate and return to the City's Contract Analyst. Complete the Subcontractor's Affidavit and Agreement, Section 00 1231, as appropriate and return to the City's Contract Analyst.

General

6. Throughout the documents, the Contractor's name and the Surety's name must be written exactly as they appear on the corporate seal, if any.

7. The Contractor shall return all sets of the executed contracts to the City's Contract Analyst for review and processing.

Section 00 1130

BID PROPOSAL

MAYOR AND ALDERMEN OF THE CITY OF SAVANNAH
POST OFFICE BOX 1027
SAVANNAH, GA 31402

PROJECT TITLE: Travis Field Water Reclamation Facility

PROJECT NUMBER: SW-524-10

DATE SUBMITTED: _____

Gentlemen:

Having carefully examined the Plans, Specifications, and other Contract Documents relating to **Travis Field Water Reclamation Facility (SW-524-10)** dated **May 2019** and Addendum No.(s) _____, and also having carefully inspected the premises and the conditions affecting the work, the undersigned hereby proposes and agrees to furnish all materials, labor, skill, equipment, tools, and other items of every kind and description specified, needed or used for the complete execution of all work covered by and in conformity with the aforesaid Plans, Specifications, and other Contract Documents prepared by Thomas & Hutton Engineering Co. and the City of Savannah and all Amendments and Addenda thereto, for the sums hereinafter stated.

In the event only one bid is received, the bid will be kept by the Owner. The contract, or commodity, will then be re–advertised and additional bids will be solicited and the new bid date will be TBD, 2019. If on the new bid date, again only one bid is received, it will be opened, analyzed and, if approved by the Mayor and Aldermen, awarded.

The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Bid Price and within the Bid Times indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

BIDDER accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:

a. BIDDER has examined and carefully studied the Plans and Specifications for the work and contractual documents relative thereto, and has read all Technical Provisions, Supplementary Conditions, and General Conditions, furnished prior to the opening of Bids and can fulfill the requirements of the work to be performed.

b. BIDDER further acknowledges hereby receipt of the following Addenda:

ADDENDUM NO.	DATE

c. BIDDER has visited the site and become familiar with and is satisfied as to the general, local and site conditions possibly affecting cost, progress, performance and furnishing of the Work.

d. BIDDER is familiar with and is satisfied as to all federal, state, and local Laws and Regulations possibly affecting cost, progress, performance and furnishing of the Work.

e. BIDDER has carefully studied all reports of explorations and tests of subsurface conditions, at or contiguous to the site, and all drawings of physical conditions in or relating to existing surface or subsurface structure, at or contiguous to the site (except underground Facilities), have been identified in the Supplementary Conditions. BIDDER acknowledges such reports and drawings are not Contract Documents and may not be complete for BIDDER's purposes.

BIDDER acknowledges OWNER and Engineer do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Bidding Documents with respect to Underground Facilities, at or contiguous to the site. BIDDER has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities), at or contiguous to the site or otherwise, or which relate any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including those identified in the bidding documents, associated safety precautions and programs incident thereto.

BIDDER does not consider any additional examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance and furnishing of the Work in accordance with the times, price and other terms and conditions of the Bidding Documents.

f. BIDDER is aware of the general nature of Work to be performed by Owner and others at the site relating to Work for which this Bid is submitted as indicated in the Bidding Documents.

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

h. BIDDER has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies BIDDER has discovered in the Bidding Documents and the

written resolution thereof by ENGINEER is acceptable to BIDDER. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

i. This bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm, or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.

j. Bidder has fully coordinated with the MBR supplier, Kubota USA, and has included in the base bid price all work, materials, labor, equipment, start-up, commissioning, and all other related work to provide a complete and fully functional plant as indicated in the specifications.

BIDDER will complete the Work in accordance with the Plans & Contract Documents for the prices as shown in Schedule of Bid Proposal. The total contract price shall include the allowances specified in Section 01 21 00 and shall include all lump sum costs related to the construction of MBR system and related equipment. The lump sum costs shall also include all Taxes, insurances, bonds, permits, overhead & profit, mobilization/demobilization, start-up & commissioning, and project administration.

The City of Savannah will pay for the followings:

a- Vertical Building Permit
b- Land Disturbing Activity Permit
c- EPD N.O.I
d- Third party special inspection
e- Third party laboratory testing (retesting of failed test shall be paid by the General Contractor)

Mobilization/Demobilization shall not exceed 1.25% of total contract amount.

SCHEDULE OF BID PROPOSAL

1. 4.0 MGD Wastewater Treatment Plant

For construction, start-up and commissioning of the new 4.0 MGD Travis Field Water Reclamation Facility complete, except for Item Nos. 2, 3, 4, 5, 6, 7, and 8.

Total Amount for Item No. 1 _____

_____ Dollars ($_____)

2. MBR/MBT Membrane Systems (Kubota USA) Allowance

For MBR/MBT equipment, start-up and commissioning, programming for 4.0 MGD WRF per the lump sum amount provided in the Appendix B.

Total Amount of Item No. 2: Two-Million Nine-Hundred Thirty-Two-Thousand Seventy-Seven and 00/100 Dollars _____ Dollars ($ 2,932,077.00)

3. UV System (Enaqua) Allowance

For purchase of UV system per the lump sum amount provided in the Appendix C.

Total Amount of Item No. 3: Five-Hundred Fifty-Nine-Thousand One-Hundred-Seventy and 00/100 Dollars (includes state sales tax) _____ Dollars ($ 559,170.00)

4. Grit Removal Systems (Hydro International / Weir Wemco) Allowance

For purchase of Grit Separator, Control Panel, Grit Pump and Grit Classifier per the lump sum amount provided in the Appendix D.

Total Amount of Item No. 4: Three-Hundred Seventy-Six-Thousand and 00/100 Dollars Dollars ($ 376,000.00)

5. Screening System (Parkson) Allowance

For purchase of Screening system per the lump sum amount provided in the Appendix E.

Total amount of Item No. 5: Seven-Hundred Sixty-One-Thousand One-Hundred-Twenty-Seven and 00/100 _____ Dollars ($ 761,127.00)

6. SCADA System (Emerson) Allowance

For purchase of SCADA equipment and programming per the lump sum amount provided in the Appendix F.

Total amount of Item No. 6_____

(includes state sales tax) _____ Dollars ($_____)

7. Crushed Stone Bedding Allowance

For 1000 CY of Crushed Stone Bedding.

Unit price per cubic yard,_____ Dollars ($_____ / CY)

Total amount of Item No. 7 _____ Dollars ($_____)

8. Remove and Replace Unsuitable Material

For removal of 2,500 CY of unsuitable material and replacement with approved offsite borrow material for construction of the wastewater treatment plant.

Unit price per cubic yard _____ Dollars ($_____/ CY)

Total amount of Item No. 8 _____ Dollars ($_____)

TOTAL AMOUNT OF BID - Items 1, 2, 3, 4, 5, 6, 7, and 8 inclusive:

_____

_____

_____ Dollars ($_____)

The undersigned agrees that this Proposal may not be revoked or withdrawn after the time is set for the opening of bids but shall remain open for acceptance for a period of sixty (60) calendar days following such time.

Upon receipt by mail or by hand delivery of the Notice of Acceptance of the Bid Proposal and Project Manual within sixty (60) calendar days after the time for the opening of bids, the undersigned agrees to execute within ten (10) calendar days a Contract (Form of Agreement between Contractor and Owner) for the work for the above–stated compensation and at the same time to furnish and deliver to the Owner a Performance Bond, Payment Bond, Certificate of Insurance, and Contractor Certification forms in accordance with the instructions found in the Project Manual.

The undersigned agrees to commence actual physical work on the site with an adequate force and equipment within ten (10) calendar days from the date to be specified in the Notice to Proceed from the Owner and to complete fully all work within **600** calendar days. It is also agreed that **40** days are included in the specific contract time for this portion of the project for adverse weather days per Article II of the agreement.

Enclosed herewith is a Bid Bond in the amount of _____DOLLARS ($_____) being not less than 5% of the Base Bid. The Bid Bond must be submitted on the required form provided with the Invitation to Bid.

If this Proposal is accepted within sixty (60) days after the date set for the opening of bids and the undersigned fails to execute the Contract within ten (10) calendar days after receipt from the OWNER/Engineer, or if the bidder fails to furnish both a Performance Bond and Payment Bond, the obligation of the Bid Bond will remain in full force and effect and the money payable thereon shall be paid into the funds of the Owner as liquidated damages for such failure; otherwise the obligation of the Bid Bond will be null and void.

This Bid Proposal is respectfully submitted by:

Bidder (Print Name)	GA Business Tax Certificate No.
Signature (Owner, Partner or Corp. Officer)	
	Address
Title	Telephone Number

If Corporation, affix seal here
(SEAL)

Section 00 1135

BIDDER'S QUALIFICATIONS

LEGAL NAME OF BIDDER:_____

STREET ADDRESS:_____

CITY, STATE, ZIP CODE_____

WHEN ORGANIZED:_____

WHEN AND WHERE INCORPORATED:_____

LICENSED OR REGISTERED TO DO BUSINESS IN STATE OF GEORGIA: __ YES __ NO

LICENSED TO DO BUSINESS IN CITY OF SAVANNAH: ___ YES ___ NO

CITY OF SAVANNAH BUSINESS LICENSE NUMBER:_____

IF NO, IN WHAT GEORGIA MUNICIPALITY DOES YOUR COMPANY HAVE A BUSINESS LICENSE:_____

BUSINESS LICENSE NUMBER FOR SAID GEORGIA MUNICIPALITY:_____

FEDERAL I.D. NUMBER: _____

If Partnership, list all partners and their addresses:

_____ _____
_____ _____
_____ _____
_____ _____

If there is no Georgia Partner, give name and address of agent for service of process in Georgia.

_____ _____
_____ _____
_____ _____
_____ _____

If an individual owner is not a Georgia resident, give name and address of agent for service of process in Georgia.

_____ _____
_____ _____
_____ _____
_____ _____

Bidder's Minimum Qualifications

Bidder shall demonstrate a minimum of 10 years of firm and key team member experience in contracting for water or wastewater treatment plant construction for municipal, public or private agencies.

Bidder shall have successfully managed / constructed a minimum of $100 million in water / wastewater public works and infrastructure improvements within the past ten (10) years. Bidders should have a minimum of 10 years of progressive project management and construction experience in water and wastewater infrastructure projects including mechanical waste activated sludge plants and preferably MBR treatment plants.

Also, the Bidder shall spotlight three (3) relevant wastewater treatment plant projects constructed within the past ten (10) years. Each project shall have a contract value of $10 Million or more, a minimum capacity of 1.0 MGD or greater, and can be for new construction or upgrade.

Each project must have included construction of cast-in-place concrete basins, installation of major process equipment, headworks, solids handling, administration and / or laboratory buildings, and supporting piping, pumping stations, electrical, instrumentation and control systems.

Descriptions of the three (3) relevant projects shall contain the following information:

- Project Name and Owner
- Owner contact information (including email address)
- Description of procurement method
- Contract value
- Year completed
- Description of the project demonstrating relevance to the City's needs
- Details on the start-up services provided
- Percentage of your firm's self-performance
- Percentage of Sub-Contractors' utilization
- Final construction cost at completion.

Include resumes for key team members (project manager, superintendent) in the bid package. Resumes should be two (2)-page maximum length per key team member.

Include Bidder's experience modification rate (EMR) calculated by the National Council on Compensation Insurance or similar rating bureau for the last five (5) years.

Documentation of the Bidder's Minimum Qualifications shall be provided in a separate sealed envelope, marked as "Bidder's Qualifications", and included with the Bid Proposal.

The foregoing statement of qualifications is submitted under oath:

Should the work require compliance with the Georgia State Construction Industry Licensing Board Rules and Regulations, the Contractor and any Subcontractor shall list the appropriate License number(s):

Main Contractor's License Number: _____

Main Contractor's DUNS Number: _____

Subcontractor #1 License Number: _____

Subcontractor #1 Name: _____

Subcontractor #2 License Number: _____

Subcontractor #2 Name: _____

Subcontractor #3 License Number: _____

Subcontractor #3 Name: _____

(List additional if appropriate)

Respectfully submitted,

Company Name: _____

Street Address: _____

City, State, Zip Code: _____

By: _____

Title: _____

Attach satisfactory evidence of the authority of the officer, or officers, signing on behalf of a corporation.

Section 00 1137

FORM OF BID BOND

KNOW ALL MEN BY THESE PRESENTS that we, _____ as Principal, and _____, a surety company duly qualified and authorized under the laws of the State of Georgia to act as Surety on bonds, as Surety, are held firmly bound unto **THE MAYOR AND ALDERMEN OF THE CITY OF SAVANNAH,** as Obligee, in the sum of: _____DOLLARS ($ _____), lawful money of the United States of America, for the payment of which, well and truly be made, we bind ourselves, our heirs, executors, administrators, successors and assignees, jointly and severally, firmly by these presents,

SIGNED, SEALED AND DATED this _____day of _____, 2019.

WHEREAS, Principal is herewith submitting its Proposal to **THE MAYOR AND ALDERMEN OF THE CITY OF SAVANNAH,** a municipal corporation of the State of Georgia, for the **Travis Field Water Reclamation Facility (SW-524-10)**.

The condition of this obligation is such that if the Principal shall permit said Proposal to remain in full force and effect for a period of sixty (60) calendar days following the opening of the bids for such work, and if within said period the Principal shall, within ten (10) days after receipt of contract documents, enter into a contract and furnish a Performance Bond and Payment Bond in accordance with terms of said Proposal then this obligation shall be null and void; but if the Principal shall fail to do any one or more of such things, this obligation shall be in force and effect, and the Principal and Surety shall promptly pay to the Obligee, as agreed liquidated damages, the full sum above stated.

SIGNED, SEALED AND DELIVERED this ____ day of _____, 2019.
(Principal must indicate whether corporation, partnership or individual.)

_____
Principal (Seal)

Witnessed:

_____ BY:_____

_____ TITLE:_____
(If a corporation, a raised corporate seal must be affixed)

_____
Surety

Attach Copy of Power of Attorney

BY:_____(Seal)
Its Attorney in Fact

_____ BY:_____
As to the Surety Attorney in Fact/Georgia Agent

Section 00 1138

CONTRACTOR AFFIDAVIT AND AGREEMENT

Employment Eligibility Verification

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. 13-10-91, stating affirmatively that the individual, firm, or corporation which is contracting with the City of Savannah has registered with and is participating in a federal work authorization program* [any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603], in accordance with the applicability provisions and deadlines established in O.C.G.A. 13-10-91.

The undersigned further agrees that, should it employ or contract with any subcontractor(s) in connection with the physical performance of services pursuant to this contract with the City of Savannah, Contractor will secure from such subcontractor(s) similar verification of compliance with O.C.G.A. 13-10-91 on the Subcontractor Affidavit provided in Section 00 12 31 of this Contract. Contractor further agrees to maintain records of such compliance and provide a copy of each such verification to the City of Savannah at the time the subcontractor(s) is retained to perform such service.

_____

EEV / Basic Pilot Program* User Identification Number

BY:

_____ _____

Contractor Name Date

_____ _____

Signature of Authorized Officer or Agent Printed Name of Authorized Officer or Agent

_____

Title of Authorized Officer or Agent of Contractor

SUBSCRIBED AND SWORN BEFORE ME ON THIS THE

_____ DAY OF _____, 20___

_____

Notary Public

My Commission Expires:_____

*As of the effective date of O.C.G.A. 13-10-91, the applicable federal work authorization program is the "EEV / Basic Pilot Program" operated by the U. S. Citizenship and Immigration Services Bureau of the U.S. Department of Homeland Security, in conjunction with the Social Security Administration (SSA).

Section 00 1139
Affidavit Verifying Residency Status for City of Savannah Benefit Application

By executing this affidavit, I, _____ [Name of natural person applying on behalf of individual, business, corporation, partnership, or other private entity], as a bidder for **Travis Field Water Reclamation Facility (SW-524-10)** or other public benefit as reference in O.C.G.A. Section 50-36-1, aver, represent and state under oath my residency status with respect to my bid for the referenced City of Savannah contract, as follows:

(1) ____ I am a citizen of the United States.

OR

(2) ____ I am a legal permanent resident 18 years of age or older *

OR

(3) ____ I am an otherwise qualified alien (8 § USC 1641) or non-immigrant under the Federal Immigration and Nationality Act (8 USC 1101 *et seq.*) 18 years of age or older and lawfully present in the United States.*

I make the above representation under oath understanding that any person who knowingly and willfully makes a false, fictitious, or fraudulent statement or representation in an affidavit shall be guilty of a violation of Code Section 16-10-20 of the Official Code of Georgia, and that such false, fictitious, or fraudulent statement or representation may also violate federal law.

_____ _____
Signature of Applicant: Date

_____
Printed Name

*_____
Alien Registration Number for Non-Citizens

SUBSCRIBED AND SWORN BEFORE ME ON THIS THE

_____DAY OF _____, 20__

_____
Notary Public

My Commission Expires: _____

Section 00 1140

NOTICE OF ACCEPTANCE OF THE BID PROPOSAL

TO:

PROJECT DESCRIPTION: **Travis Field Water Reclamation Facility**
PROJECT NUMBER: **SW-524-10**

The Mayor and Aldermen of the City of Savannah have considered the Bid submitted by your firm for the above described PROJECT in response to our Invitation to Bid dated _____. On _____, your bid, amounting to $_____ was approved by the Mayor and Aldermen. You are hereby notified that your BID has been accepted and that your firm has been awarded a contract for referenced project.

Upon receipt of the contract documents, please execute the Agreement and the Performance and Payment Bonds, but do not date them. Also provide Certificate of Insurance and all other required contract documents which shall be returned to the City Project Manager/Project Engineer no later than ten (10) calendar days after receipt. Performance and Payment Bonds may be waived for contracts awarded under $100,000.00.

You are required to return an acknowledged copy of this NOTICE OF ACCEPTANCE OF THE BID PROPOSAL to the Contract Analyst.

Dated this _____ day of _____, 2019.

FOR THE CITY OF SAVANNAH

By:_____
John L. Sawyer
Public Work/Water Resources Director

Acceptance of Notice

Receipt of the above Notice of Acceptance of the Bid Proposal is hereby acknowledged.

BY:_____ Contractor_____

_____
Title

THIS THE _____ DAY OF _____, 20_____

Section 00 1150

DEBARMENT AND SUSPENSION REQUIREMENTS

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS PRIMARY COVERED TRANSACTIONS

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 29 CFR Part 98, Section 98.510, Participants' Responsibilities. The regulations were published as Part VII of the May 26, 1988 Federal Register (pages 19160-19211).

The prospective primary participant certifies that it and its principals:

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

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

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

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

e) Contractor will be verified against the General Service Administration (GSA) debarred list at GSA's website https://www.sam.gov/SAM/pages/public/searchRecords/search.jsf

Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participants shall attach an explanation to this proposal.

_____

Name and Title of Authorized Representative

_____ _____

Signature Date

CONTRACT AND PAYMENT FORMS

CONTRACT FORMS

00 1200	Agreement
00 1205	Performance Bond
00 1210	Payment Bond
00 1215	Bond Affidavit
00 1220	Certificate of Insurance
00 1225	Contractor's Certification
00 1230	Subcontractor's Certification
00 1231	Subcontractor Affidavit & Agreement Employee Eligibility Verification

Section 00 1200

AGREEMENT

THIS AGREEMENT, made on the _____ day of _____, 20___, by and between **THE MAYOR AND ALDERMEN OF THE CITY OF SAVANNAH,** party of the first part, hereinafter called the OWNER, and _____, party of the second part, hereinafter called the CONTRACTOR.

WITNESSETH: that the Contractor and the Owner, for the considerations hereinafter named, agree as follows:

ARTICLE I - Scope of Work

The Contractor hereby agrees to furnish all of the materials and all of the equipment and labor necessary, and to perform all of the work shown on the plans and described in the Project Manual for the project entitled: **Travis Field Water Reclamation Facility (SW-524-10)**, all in accordance with the requirements and provisions of the Contract documents and the Contractor's Proposal submitted _____, 2019, as defined in the General Conditions all of which are hereby made a part of this Agreement.

ARTICLE II - Time Completion

(a) The work to be performed under this Contract shall be commenced within ten (10) calendar days after the date of the Notice to Proceed. Contract time shall be determined on the calendar day basis. The work shall be completed within **600** calendar days after the date of such Notice with such extensions of time as are provided for in the General Conditions. It is agreed that **40** days have been included in the contract time for delays due to adverse weather conditions based on National Oceanographic and Atmospheric Administration (NOAA) historical data.

ARTICLE III - Contract Price

The Owner shall pay the Contractor as just compensation for the performance of this contract, subject to any additions or deductions as provided in the Contract Documents, the unit or lump sum price as contained in the Bid Schedule attached hereto.

The Contract Amount is _____Dollars ($_____) based upon unit and lump sum prices extended as herein contained.

THIS AGREEMENT SHALL BE BINDING UPON ALL PARTIES HERETO AND THEIR RESPECTIVE HEIRS, EXECUTORS, ADMINISTRATORS, SUCCESSORS, AND ASSIGNS.

THE BID SCHEDULE OF THE SUCCESSFUL BIDDER

SHALL BE CONFORMED AND INSERTED HEREIN

TO BECOME A PART OF THE COMPLETED CONTRACT

DOCUMENT

ARTICLE IV - Acceptance and Final Payment

(a) Upon receipt of written notice from the City Project Manager/Project Engineer that the work is ready for final inspection and acceptance, the Owner shall within 1 week make such inspection, and when the Owner finds the work complete under the Contract and the Contract fully performed the Owner will promptly issue a final certificate, over the owner's signature, stating that the work required by this contract has been completed and is accepted by him under the terms and conditions thereof, and the entire balance found to be due the Contractor, including the retained percentage, shall be paid to the Contractor by the Owner within thirty (30) days after the date of final certificate and receipt of record drawings.

(b) Before final payment is made, the Contractor shall submit evidence satisfactory to the City Project Manager/Project Engineer that all payrolls, material bills, and other indebtedness connected with work have been paid, except that in case of disputed indebtedness or liens, the Contractor may submit in lieu of evidence of payment a surety bond satisfactory to the Owner guaranteeing payment of all such disputed amounts when adjudicated in cases where such payment has not already been guaranteed by surety bond.

(c) If after the work has been substantially completed, full completion thereof is materially delayed through no fault of the Contractor, and the City Project Manager/Project Engineer so certifies, the Owner shall, upon certification of the City Project Manager/Project 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.

ARTICLE V - Component Parts of the Contract

This Contract consists of the following component parts, all of which are hereby made a part hereof as if herein set out in full:

1. Invitation to Bids
2. Instruction to Bidders
3. Bid Proposal
4. Bid Bond
5. Agreement
6. Payment and Performance Bonds
7. Certificate of Insurance
8. Contractor's Certification
9. Notice of Acceptance of Bid Proposal
10. General Conditions
11. Supplemental General Conditions, if required
12. City/Federal Labor Standards Provisions/Equal Opportunity Provisions
13. Contract Administrative Forms
14. Technical Provisions
15. Other Documents as may be required by law or appended hereto.
16. Plans and Drawings: as prepared by: Thomas & Hutton Engineering Co. dated May 2019. Specifications prepared or issued by: Thomas & Hutton Engineering Co. and The City of Savannah and dated May 2019.

ADDENDA:

No. _____, dated _____, 2019

No. _____, dated _____, 2019

No. _____, dated _____, 2019

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed as of the day and year first above written in seven (7) counterparts, each of which shall for all purposes be deemed an original.

OWNER:
THE MAYOR AND ALDERMEN
OF THE CITY OF SAVANNAH

_____
BY: Roberto Hernandez
CITY MANAGER

ATTEST:

(SEAL)

_____
BY: Mark Massey
CLERK OF COUNCIL

Contractor must indicate whether corporation, partnership, or individual.

ATTEST:

_____
NAME

_____
TITLE

_____
CONTRACTOR

_____
BY

_____
TITLE:

CONTRACTOR'S ADDRESS:

_____ (P.O. Box)
_____ (Physical Address)
_____ (City, State, Zip)

(SEAL)

(If a corporation, a raised corporate seal must be affixed)

CONTRACTOR'S FEDERAL I.D. NO._____

Section 00 1205

CONTRACT BOND
PERFORMANCE

KNOW ALL MEN BY THESE PRESENTS, that we, _____, (hereinafter called Principal), and _____,a surety company duly qualified and authorized under the laws of the State of Georgia to act as Surety on bonds (hereinafter called the Surety) are held and firmly bound unto THE MAYOR AND ALDERMEN OF THE CITY OF SAVANNAH, a municipal corporation created and existing under the laws of the State of Georgia (hereinafter called the Owner) in the penal sum of _____Dollars ($_____) lawful money of the United States of America, to be paid to THE MAYOR AND ALDERMEN OF THE CITY OF SAVANNAH, a municipal corporation as aforesaid, for the payment whereof well and truly to be made we do bind ourselves, our respective executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

SIGNED, SEALED AND DELIVERED this _____ day of _____ 20__, A.D.

NOW THEREFORE, the condition of this obligation is such that whereas the said PRINCIPAL _____ has entered into that certain contract with THE MAYOR AND ALDERMEN OF THE CITY OF SAVANNAH for the **Travis Field Water Reclamation Facility (SW-524-10)**, a copy of said contract being attached hereto and made a part hereof the same as if set forth fully herein.

NOW THEREFORE, if the above bonded Principal and the said SURETY, _____, shall in all respects faithfully and fully perform the terms and conditions of the said contract on their part and shall pay to THE MAYOR AND ALDERMEN OF THE CITY OF SAVANNAH, all costs, expenses, damages, and injuries sustained by said Owner by reason of any failure on the part of the said Principal to fully perform said contract and shall indemnify and save harmless the Owner from any and all liability of any nature, kind and character which may be incurred in the performance or fulfillment of such contract or other such liability resulting from negligence or otherwise on the part of such kind, character and description which may be incurred by the Owner in making good any and every default which may exist on the part of the Principal in connection with the performance of said contract, and further shall promptly make payments to all persons supplying the said Principal or any subcontractor labor, materials and supplies used directly or indirectly by said Principal or any subcontractors in the prosecution of the work provided for in said contract; then this obligation shall become null and void; else to remain in full force and effect.

Any failure or default on the part of the Principal in the payment of any lawful claim or any person supplying the said Principal or any subcontractor with labor, material and supplies used directly or indirectly as aforesaid in the prosecution of the work provided for in said contract, shall give such person a direct right of action against the Principal and Surety under this obligation; provided, however, that no suit, action or proceeding by reason of any default whatever shall be brought on this bond after one year from the date on which final payment under the contract falls due.

It is further covenanted and agreed that any alterations or additions made under said contract or in the work to be performed thereunder or the granting of any extension of time for the performance of the contract or any other forbearance by or on the part of either the Owner or the Principal shall not in any way release the Principal and Surety, or either of them, their executors, administrators, successors, or assigns, from any liability hereunder. Notice to the Surety of such alterations, extensions, or forbearance is hereby expressly waived. This obligation shall remain in full force and effect until the full performance of all covenants, terms and conditions herein stipulated.

IN WITNESS WHEREOF, the said _____ , as Principal, has caused these presents to be executed by its proper offices and its corporate seal hereunto affixed, and the said _____, as Surety, has caused these presents to be signed in its name by its attorney in fact, under its corporate seal, this ____ day of _____, 20__.

SIGNED, SEALED AND DELIVERED
In the presence of:

_____ (SEAL)
PRINCIPAL

BY:_____

_____ ATTEST:_____
As to the Principal

_____
Surety

BY:_____(SEAL)
It's Attorney in Fact

_____ BY:_____
As to the Surety Attorney in Fact/Georgia Agent

(If a corporation, a raised corporate seal must be affixed.)

Section 00 1210

CONTRACT BOND
PAYMENT

KNOW ALL MEN BY THESE PRESENTS, that we, _____, (hereinafter called Principal), and _____,a surety company duly qualified and authorized under the laws of the State of Georgia to act as Surety on bonds (hereinafter called the Surety) are held and firmly bound unto THE MAYOR AND ALDERMEN OF THE CITY OF SAVANNAH, a municipal corporation created and existing under the laws of the State of Georgia (hereinafter called the Owner) in the penal sum of _____Dollars ($_____) lawful money of the United States of America, to be paid to THE MAYOR AND ALDERMEN OF THE CITY OF SAVANNAH, a municipal corporation as aforesaid, for the payment whereof well and truly to be made we do bind ourselves, our respective executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

SIGNED, SEALED AND DELIVERED this _____ day of _____ 20__, A.D.

NOW THEREFORE, the condition of this obligation is such that whereas the said PRINCIPAL _____has entered into that certain contract with THE MAYOR AND ALDERMEN OF THE CITY OF SAVANNAH for the **Travis Field Water Reclamation Facility (SW-524-10)**, a copy of said contract being attached hereto and made a part hereof the same as if set forth fully herein.

NOW THEREFORE, if the above bonded Principal and the said SURETY, _____, shall in all respects faithfully and fully perform the terms and conditions of the said contract on their part and shall pay to THE MAYOR AND ALDERMEN OF THE CITY OF SAVANNAH, all costs, expenses, damages, and injuries sustained by said Owner by reason of any failure on the part of the said Principal to fully perform said contract and shall indemnify and save harmless the Owner from any and all liability of any nature, kind and character which may be incurred in the performance or fulfillment of such contract or other such liability resulting from negligence or otherwise on the part of such kind, character and description which may be incurred by the Owner in making good any and every default which may exist on the part of the Principal in connection with the performance of said contract, and further shall promptly make payments to all persons supplying the said Principal or any subcontractor labor, materials and supplies used directly or indirectly by said Principal or any subcontractors in the prosecution of the work provided for in said contract; then this obligation shall become null and void; else to remain in full force and effect.

Any failure or default on the part of the Principal in the payment of any lawful claim or any person supplying the said Principal or any subcontractor with labor, material and supplies used directly or indirectly as aforesaid in the prosecution of the work provided for in said contract, shall give such person a direct right of action against the Principal and Surety under this obligation; provided, however, that no suit, action or proceeding by reason of any default whatever shall be brought on this bond after one year from the date on which final payment under the contract falls due.

It is further covenanted and agreed that any alterations or additions made under said contract or in the work to be performed thereunder or the granting of any extension of time for the performance of the contract or any other forbearance by or on the part of either the Owner or the Principal shall not in any way release the Principal and Surety, or either of them, their executors, administrators, successors, or assigns, from any liability hereunder. Notice to the Surety of such alterations, extensions, or forbearance is hereby expressly waived. This obligation shall remain in full force and effect until the full performance of all covenants, terms and conditions herein stipulated.

IN WITNESS WHEREOF, the said_____, as Principal, has caused these presents to be executed by its proper offices and its corporate seal hereunto affixed, and the said _____, as Surety, has caused these presents to be signed in its name by its attorney in fact, under its corporate seal, this ____ day of _____, 20__.

SIGNED, SEALED AND DELIVERED
In the presence of:

_____ (SEAL)
PRINCIPAL

BY:_____

_____
As to the Principal

ATTEST:_____

_____
Surety

BY:_____(SEAL)
It's Attorney in Fact

_____
As to the Surety

BY:_____
Attorney in Fact/Georgia Agent

(If a corporation, a raised corporate seal must be affixed.)

Section 00 1215

BOND AFFIDAVIT

State of _____

County of _____

Before me, the undersigned authority, personally appeared _____, who, being duly sworn, deposes and says that he /she is a duly authorized insurance agent, properly licensed under the laws of the State of _____, to represent _____of _____, a company authorized to make corporate surety bonds under the laws of the State of Georgia.

Said agent further certifies that as Attorney-in-fact for the said _____ has signed the attached bond in the sum of _____ (U.S. $ _____) on behalf of the contractor, _____ covering the Project, **Travis Field Water Reclamation Facility (SW-524-10),**

Said agent further certifies that the premium on the said bond is _____which will be paid in full direct to him/her as Agent, and included in his/her regular accounts to the said surety, _____and that he/she will receive the regular commission of _____ percent as Agent for the execution of said Bond and that his commission will not be divided with anyone except as follows: _____ percent to _____, who is duly authorized resident insurance agent and properly licensed under the laws of the State of Georgia.

_____ (Georgia agent) who, being duly sworn, deposes and says that he/she is a duly authorized insurance agent properly licensed under the laws of the State of Georgia.

Countersigned:

_____ _____

Agent and Attorney In Fact Georgia Agent/License No.

Sworn to and subscribed before me
This _____ day of _____, 20____.

_____

Notary Public

My commission expires:

_____

Section 00 1220

CERTIFICATE OF INSURANCE

The City requires in addition to the Certificate of Insurance, endorsements to each policy to include a 30-day cancellation notice and a waiver of subrogation in favor of Mayor and Aldermen of the City of Savannah, its agents and / or employees.

NOTE: Please attach Certificate of Insurance and Endorsements to this page.

Section 00 1225

CONTRACTOR'S CERTIFICATION
CONCERNING LABOR STANDARDS & PREVAILING WAGE REQUIREMENTS

Project Name: Travis Field Water Reclamation Facility
Project Number: SW-524-10

1. The undersigned having executed a contract with The Mayor and Aldermen of the City of Savannah for the construction of the above identified project acknowledges that:

   (a) The Labor Standards Provisions are included in the aforesaid contract;

   (b) Correction of any infractions of the aforesaid conditions, including infractions by any of his subcontractors and any low tier subcontractor, is his responsibility;

2. Contractor certified that:

   (a) Neither the contractor nor any firm, partnership or association in which the contractor has substantial interest is designated as an ineligible contractor by the Comptroller General of the United States pursuant to Section 5.6 (b) of the Regulations of the Secretary of Labor, Part 5 (29 CFR, Part 5) or pursuant to Section 3(a) of the Davis-Bacon Act, as amended [10 U.S.C. 176a - 2(a)].

   (b) No part of the aforementioned contract has been or will be subcontracted to any subcontractor if said subcontractor or any firm, corporation, partnership or association in which such subcontractor has a substantial interest is designated as an ineligible contractor pursuant to any of the aforementioned regulatory or statutory provisions.

3. The contractor agrees to obtain and forward to the aforementioned recipient within ten days after the execution of a subcontract, including those executed by his subcontractors and any lower tier subcontractors, a Subcontractor's Certificate Concerning Labor Standards and Prevailing Wage Requirements executed by the subcontractors.

4. The contractor certifies that:

   (a) The legal name and business address of the undersigned are:

   _____
   _____
   _____
   _____

(b) The undersigned is:

1. ____ Single Proprietorship
2. ____ Partnership
3. ____ Corporation Organized
4. ____ Other Organization (Describe)

(c) The name, title, and address of the owner, partners or officers of the undersigned are:

Name	Title	Address

(d) The name and address of all other persons both natural and corporate having substantial interest in the undersigned and the nature of the interest are: (If none so state.)

Name	Title	Address

(e) The name, address and trade classification of all other building construction contractors in which the undersigned has a substantial interest are: (If none so state.)

Name	Title	Trade Classification

Date: _____ By: _____
Contractor

WARNING

U. S. Criminal Code, Section 1010, Title 18, U.S.C., provides in part: "Whoever...makes, passes, utters or publishes any statement, knowing the same to be false...shall be fined not more than $5,000 or imprisoned not more than two years, or both."

Section 00 1230

SUBCONTRACTORS CERTIFICATIONS CONCERNING LABOR STANDARDS & PREVAILING WAGE REQUIREMENTS

Project Name: Travis Field Water Reclamation Facility
Project Number: SW-524-10

1. The undersigned having executed a contract with _____ (Contractor) for construction of the above identified project acknowledges that:

(a) The Labor Standard Provisions are included in the aforesaid contract;

(b) Neither the subcontractor or any firm, partnership or association in which the subcontractor has substantial interest is designated as an ineligible contractor by the Comptroller General of the United States pursuant to Section 5.6(b) of the Regulations of the Secretary of Labor, Part 5 (29 CFR, Part 5) or pursuant to Section 3(a) of the Davis-Bacon Act, as amended [40 U.S.C. 176 a - 2(a)].

(c) No part of the aforementioned contract has been or will be subcontracted to any subcontractor if said subcontractor or any firm, corporation, partnership or association in which subcontractor has a substantial interest is designated as an ineligible contractor pursuant to any of the aforementioned regulatory or statutory provisions.

2. The subcontractor agrees to obtain and forward to the aforementioned recipient within ten days after the execution of a subcontract, including those executed by his subcontractors and any lower tier subcontractors, a Subcontractor's Certificate Concerning Labor Standards and Prevailing Wage Requirements executed by the lower tier subcontractors.

(a) The workmen will report for duty on or about _____.

3. The subcontractor certifies that:

(a) The legal name and business address of the undersigned are:

_____

_____

_____

_____

_____

_____

The undersigned is:

1. ____ A Single Proprietorship
2. ____ A Partnership
3. ____ A Corporation Organized in the State of _____
4. ____ Other Organization (Describe)

(b) The name, title, and address of the owner, partners or officers of the undersigned are:

Name Title Address

(c) The name and address of all other persons both natural and corporate having substantial interest in the undersigned and the nature of the interest are: (If none so state.)

Name Title Address

(d) The name, address and trade classification of all other building construction contractors in which the undersigned has a substantial interest are: (If none so state.)

Name Title Trade Classification

Date: _____ By: _____
Subcontractor

WARNING

U. S. Criminal Code, Section 1010, Title 18, U.S.C., provides in part: "Whoever...makes, passes, utters or publishes any statement, knowing the same to be false...shall be fined not more than $5,000 or imprisoned not more than two years, or both."

Section 00 1231

SUBCONTRACTOR AFFIDAVIT AND AGREEMENT

Employment Eligibility Verification

By executing this affidavit, the undersigned subcontractor verifies its compliance with O.C.G.A. 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract with _____
(Contractor)
on behalf of the City of Savannah has registered with and is participating in a federal work authorization program* [any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P .L. 99-603], in accordance with the applicability provisions and deadlines established in O.C.G.A. 13-10-91.

_____
EEV / Basic Pilot Program* User Identification Number

BY:

_____ _____
Subcontractor Name Date

_____ _____
Signature of Authorized Officer or Agent of Subcontractor Printed Name of Authorized Officer or Agent

_____
Title of Authorized Officer or Agent of Subcontractor

SUBSCRIBED AND SWORN BEFORE ME ON THIS THE

_____DAY OF_____,20___

_____
Notary Public

My Commission Expires: _____

*As of the effective date of O.C.G.A. 13-10-91, the applicable federal work authorization program is the "EEV / Basic Pilot Program" operated by the U. S. Citizenship and Immigration Services Bureau of the U.S. Department of Homeland Security, in conjunction with the Social Security Administration (SSA).

LABOR STANDARDS/EQUAL OPPORTUNITY PROVISIONS

Section 00 1300

CITY LABOR STANDARDS / E.E.O. PROVISIONS

01 - LABOR STANDARDS PROVISIONS: The attached Labor Standards Provisions are a part of the contract documents and shall be complied with on the project. Conduct of the work shall conform to the following Payment of the Prevailing Rate of Wages and Decision Number GA180089 and GA180129.

Payment of the Prevailing Rate of Wages

1. All construction contracts to be let by the City of Savannah shall include a wage determination for each classification of employees based on the rate of wages which have been approved by the Department of Labor pursuant to the Davis-Bacon Act for Chatham County.

2. A copy of the wage determination must be posted by the successful contractor and maintained where it can easily be seen by all employees.

3. Rates of pay for each classification of employees shall be at least the minimum shown on the wage determination for each classification.

4. No classification of employee shall be employed on a project unless either the classification appears on the wage determination as set forth in the contract or the classification and rate have been approved by the City of Savannah.

5. Each week as work progresses, the Contractor must submit to the City of Savannah within seven (7) days, a copy of all payroll records with an affidavit that the weekly wages paid are not less than the applicable wage rates contained in the wage determination incorporated into the contract and the classification set forth therein for each laborer or mechanic conforms with the work he performed.

6. All prime contractors shall include the wage determination and all provisions specified herein in all subcontracts.

7. The contractors shall make employment records available for inspection by authorized representatives of the City of Savannah and will permit employees to be interviewed during working hours by these representatives to determine compliance with provisions of the standards set forth herein.

8. In the event of a violation of these provisions, the City of Savannah may, after notice of the contractor, terminate the contract for failure to comply with these provisions.

02 - DISCRIMINATION PROHIBITED:

(a) In all hiring or employment made possible by or resulting from this contract, there (1) shall not be any discrimination against any employee or origin, and (2) affirmative action shall be taken to ensure that applicants are employed, and that employees are treated during employment without regard to race, color, religion, sex, or national origin. This requirement shall apply to, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising; lay-off or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. There shall be posted in conspicuous places, available to employees and applicants for employment, notices to be provided by HUD setting forth the provisions of this clause. All solicitations or advertisements for employees shall state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.

(b) No person in the United States shall, on the ground of race, color, religion or national origin, be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity made possible by or resulting from this Contract. The Contractor and each employer will comply with all requirements imposed by or pursuant to the regulations of HUD effectuation Title VI of the Civil Rights Act of 1964.

(c) The Contractor hereby agrees that he will incorporate into any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained pursuant to the Contract, the equal opportunity clause which is a part of the labor standard provision attached hereto.

The Contractor further agrees that he will be bound by the equal opportunity clause and other provisions of 41 CFR Chapter 60 with respect to its own employment practices when it participates in federally assisted construction work.

The Contractor agrees that he will assist and cooperate actively with HUD and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clauses and the rules, regulations, and relevant orders of the Secretary of Labor, that he will furnish HUD and the Secretary of Labor such information as they may require for the supervision of such compliance, and that he will otherwise assist HUD in the discharge of its primary responsibility for securing compliance.

The Contractor further agrees that it will refrain from entering into any contract or contract modification subject to Execution Order 11246 of September 24, 1965, with a contractor debarred from or who has not

demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order. In addition, the Contractor agrees that if he fails or refuses to comply with these undertakings, the City Manager may take any or all of the following actions:

Terminate or suspend in whole or in part this contract; refrain from extending any further payment to the Contractor under the contract with respect to which the failure or refusal occurred until satisfactory assurance of future compliance has been received from such Contractor; and refer the case to the Department of Justice for appropriate legal proceedings.

(d) The Contractor further agrees to establish and execute personnel policies in compliance with City and HUD guidelines.

03 - EQUAL OPPORTUNITY:

A. The Contractor/Subcontractor shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, age, or natural origin. The Contractor/Subcontractor shall take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, religion, color, sex, or age or national origin. As used herein, the work "treated" shall include, without limitation, the following: recruited, whether by advertising or other means; compensated, whether in the forms of rates of pay or other forms of compensation; selected for training, including apprenticeship; promoted, upgraded; demoted; downgraded; transferred, laid off; and terminated. The Contractor/Subcontractor agrees to and shall post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officers setting forth the provisions of the non-discrimination clause.

Contractor's/Subcontractor's affirmative action plan should provide at least the following elements:

1. Company's Equal Employment Opportunity Policy:

   A statement which clearly states the company's policy of non-discrimination in employment because of race, color, religion, age or national origin.

2. Coordination and Administration of Program:

   Designate a person of responsibility and authority in the company and the address and telephone number of that person who will be responsible for coordination of the company's equal employment opportunity program. Also, specify procedures by which policy and affirmative action program will be disseminated to all employees.

3. Analysis of:

   a. Recruitment and Employment Practices:
   Evaluate the extent to which present practices and policies, including recruitment sources, act to exclude minorities from becoming applicants for employment with your company.

   b. Work Force:
   Evaluate the current extent of minority group employment in management, clerical, skilled, and semi-skilled categories with the company during the period in which the HUD assisted work is being done.

4. Establishment of Goals and Timetables:

   Based on the analysis done in the preceding section, develop numerical goals (in numbers or percentage man-hours) to work toward within a given time period (time period with which HUD assisted work will be done) in placing minorities in management, clerical, skilled, semi-skilled, or unskilled positions or trainee positions for your company.

5. Specified Affirmative Action Steps:

   Develop specific affirmative action steps which the company will make in efforts to reach goals and thus provide equal employment opportunity.

6. A prospective Contractor/Subcontractor for work in connection with Community Development project shall provide the City with a preliminary statement of work force needs (management, clerical, skilled, semi-skilled, unskilled labor and trainees by category) to accompany the contractor's bid proposal.

7. The Contractor shall provide the City with the Contractor's and Subcontractor's Affirmative Action Plans to accompany the Contractor's bid proposal.

B. The Contractor/Subcontractor shall, in all solicitation or advertisements for applicants for employees placed by or on behalf of the Contractor/Subcontractor, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex, age, or national origin.

C. The Contractor/Subcontractor shall send to each labor union or representative of workers with which collective bargaining agreement or

other contractor or understanding has been reached, if any, a notice advertising the labor union or worker's representative of the Contractor commitments under the Equal Employment Opportunity of the City of Savannah, and shall post copies of the notice in conspicuous places available to employees and applicants for employment or training.

D. The Contractor/Subcontractor shall furnish all information and reports required by the City or its representative, and shall permit access to any books, records, and accounts for purposes of investigation to ascertain compliance with the program.

E. The Contractor shall take such action with respect to any Subcontractors as the City may direct as a means of enforcing the provisions of paragraphs (a) through (i) herein, including penalties and sanctions for noncompliance, provided however, that in the event the Contractor becomes involved in or is threatened with litigation as the result of such direction by the City, the City will enter into such litigation as is necessary to protect the interests of the City and to effectuate the City's Equal Employment Opportunity Program and in the case of contracts receiving Federal assistance, the Contractor or the City may request the United States to enter into such litigation to protect the interests of the United States.

F. The Contractor shall cause each Subcontractor, if any, to file compliance reports with the City in the form and to the extent prescribed by the City or its representative. Compliance reports filed at such time as directed shall contain information as to the employment practices, policies, programs and statistics of the Contractor and any Subcontractor.

G. The Contractor shall include the provisions of paragraphs (a) through (h) of this Equal Employment Opportunity Policy in every subcontract or purchase order of $10,000 or more so that such provisions will be binding upon each Subcontractor or vendor.

H. Refusal or failure of a prospective Contractor to comply with the provisions of this section as applicable at the time of bidding, as to the Contractor or a prospective Subcontractor, shall result in that Contractor not being considered a responsible bidder and may result in the rejection of the bid, or if such failure or refusal is discovered after award of the contract, the Contractor or Subcontractor shall be subject to the provisions of subsection (i) below.

I. Refusal by the Contractor or Subcontractor to comply with any part on or of this program as herein stated and described will subject the offending party to any or all of the following penalties:

1. Withholding all future payments under the involved public contract to the party in violation until it is determined that the party is in compliance with the provisions of the contract.

2. Refusal of all future bids where a party is a Contractor or Subcontractor under any public contract with the City of Savannah or any of its departments or divisions until such time as the Contractor or Subcontractor demonstrates that the policy herein outlined shall be complied with by each party.

3. Suspension or termination of the public contract and declaration of forfeiture of the performance bonds as the Contractor or suspension or termination as to the rights of payment to the Subcontractor.

4. In cases in which there is substantial or material violation or the threat of substantial or material violation of the compliance procedure, or as may be provided for by contract, appropriate proceedings may be brought to enforce those provisions, including the enjoining, within applicable laws, of Contractors, Subcontractors, or other organizations, individuals or groups who prevent directly, indirectly, or seek to prevent directly or indirectly compliance with the policy, as herein outlined.

J. As used herein, the term "Subcontractor" shall be used as the singular or plural and refer to any party with whom a Contractor or prospective Contractor shall perform work or provide supplies or materials of $10,000 or more under the proposed or actual contract.

04 - SUBCONTRACTS:

None of the work or services covered by this contract shall be subcontracted hereunder after the award of a contract without the prior written approval of the City. Any work or services subcontracted hereunder shall be specified by written contract or agreement and shall be subject to each provision of this contract. Contractors are encouraged to hire local Subcontractors and procure from local suppliers as provided in paragraph 05, Opportunities for Residents.

05 - OPPORTUNITIES FOR RESIDENTS:

A. Employment: In all work made possible by or resulting from this contract, affirmative action will be taken to insure that residents of the Community Development Project Area are given maximum opportunities for training and employment. The project area is defined as the corporate limits of the City of Savannah.

B. Procedures for Recruiting Low Income Residents Under Section 3 Covered Projects: Each Contractor and Subcontractor must employ the following procedures for seeking low income area residents for employment

in entry level and vacant positions:

1. Advertisements in local newspapers, including minority owned newspapers, and through signs placed at the proposed project site.

2. Solicit applicants through the Savannah Area Minority Contractors Association and the CETA Unit of the Georgia State Employment Service.

3. Maintain a list of all low income area residents who have applied on their own or on referral from any source and employ such persons if otherwise eligible and if a vacancy exists.

4. Any Contractor or Subcontractor who fills vacant positions at any time after award of the contract to the party (Contractor/Subcontractor) who will undertake work pursuant to this contract shall set forth evidence acceptable to the City that its actions were not an attempt to circumvent these regulations.

C. Business Opportunities: All factors being equal, including price, it is the City's policy to give preference in awarding contracts in the following order of priority:

1. Business concerns located in or owned in substantial part by residents of the target area. The definition of target area is those planning units in which Community Development work is being performed.

2. Business concerns located in or owned in substantial part by residents of the project area. Project area is defined as the corporate limits of the City of Savannah.

The exception to the above is in the case of an urban renewal area whereby the project area is defined as the boundaries of the urban renewal area.

06 - SAFETY AND HEALTH REGULATIONS:

The Contractor shall comply with the Department of Labor and Safety and Health Regulations for construction promulgated under Occupational Safety and Health Act of 1970 (PL-91-5996) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL-91-54). The regulations are administered by the Department of Labor and the Contractor shall allow access to the project to personnel from that Department.

07 - ACCESS TO ALL RECORDS:

The Contractor must guarantee to the Department of H.U.D., the Comptroller General of the United States, the City of Savannah, or any authorized representative access to any books, documents, papers and records of the Contractor and Subcontractor which are pertinent to the Project.

08 - NON-SEGREGATED FACILITIES:

A. A Certification of Non-Segregated Facilities, as required by the May 19, 1987 order, on elimination of segregated facilities by the Secretary of Labor must be submitted by the Contractor prior to the award of this contract.

B. A Certification of Non-Segregated Facilities, as required by the May 19, 1967 order (32 F.R. 7439, May 1967), on elimination of segregated facilities, by the Secretary of Labor must be submitted prior to the award of the subcontract exceeding $10,000 Clause.

C. Contractors receiving subcontract awards exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide for the forwarding of the Notice to Prospective Subcontractors for supplies and construction contracts where the subcontracts exceed $10,000 and are not exempt from the provisions of the Equal Opportunity Clause.

SECTION 00 1305

Hire Savannah Program Participation

a. The City of Savannah seeks to increase the utilization of the local workforce to the greatest extent possible on City contracts. To achieve this priority, the City of Savannah Mayor and Aldermen endorse efforts to establish hiring agreements with businesses benefitting from municipal contracts with the City to hire local workers residing in the city of Savannah, Georgia.
b. To the extent otherwise permitted by law, the requirements of the Hire Savannah Program shall be included in all bid awards of $100,000 or more for covered services and $250,000 or more for construction-related services as a method of inducing contractors to hire qualified workers who reside in Savannah, Georgia.
c. To assist contractors in maximizing local labor use, the City of Savannah has partnered with WorkSource Coastal (WSC). WSC assists employers and job seekers in meeting job training and employment needs throughout the ten-county coastal region including Savannah and Chatham County. WSC will post contractor job openings, coordinate recruitment among partner agencies, and refer qualified candidates to contractors for hiring consideration. Additional employer services are also available through WSC, including federally-subsidized training and/or wages for eligible activities.
d. The Contractor is fully responsible for the work performed under the contract, and this responsibility is not in any way diminished by the use of labor supplied by WSC, nor is the City of Savannah or WSC accepting any responsibility for non-compliance with the contract due to the performance, or lack thereof, on part of labor supplied by WSC.
e. The Contractor is responsible for the compliance of all contractors providing services under the Covered Contract, including subcontractors and lower-tier subcontractors but excluding material manufacturers and suppliers, with the requirements of the Hire Savannah Policy.
f. In responding to this solicitation, the bidder/proposer shall complete a Hire Savannah Agreement, indicating that it agrees to be bound to contractual obligations to use good faith efforts to meet Hire Savannah Program requirements and hire Qualifying Workers residing in Savannah, Georgia.
g. If the bidder or proposer fails to respond affirmatively, it shall be deemed non-responsive to the solicitation.

HIRE SAVANNAH AGREEMENT

Event #:		Event Name:	
Bidder/Proposer Name:			

The City of Savannah Mayor and Aldermen have established a priority to increase the utilization of the local workforce to the greatest extent possible on City contracts. To achieve this goal, the City has established the Hire Savannah Policy and Program which shall be included in all eligible bid awards of $100,000 or more for covered services and $250,000 or more for construction-related services as a method of inducing contractors to hire qualified workers who reside in Savannah Georgia.

Contractors responding to this solicitation are required, as an issue of responsibility, to indicate that it agrees, if awarded a Covered Contract, to be bound to contractual obligations requiring it to use good faith efforts to meet the Hire Savannah Program requirements. If the bidder or proposer fails to respond affirmatively, it shall be deemed non-responsive to the solicitation.

A "Covered Contract" is a City-awarded contract that: (a) is not subject to state or federal requirements that prohibit or pre-empt the application of this Program to the contract; and (b) pays the Contractor $100,000 or more for covered services or $250,000 or more for construction-related services. "Construction-related Services" means services purchased by the City that involve construction, demolition, alteration and/or repair of city buildings, city public works or other city facilities.

Covered Services include the following services purchased by the City: food preparation or distribution; security services; routine maintenance services, such as janitorial, cleaning, refuse removal, recycling collections, and other similar services for normal upkeep of facilities; repair or refinishing services for furniture, fixtures, vehicles, machinery, or equipment, including preventative maintenance replacement of parts, and other activities needed to preserve the asset; clerical or other nonsupervisory office work, whether by temporary or permanent personnel; printing and reproduction services; and landscaping, lawn, or agricultural services. Covered Services does not include professional services, which are those technical services provided by an individual licensed Georgia professional or a registered professional consultant, including but not limited to lawyers, architects, engineers, and other design consultants.

The City of Savannah Hire Savannah Policy is posted on the City of Savannah website. By signing below, the Bidder/Proposer affirms that it has read, understands and agrees to be bound by the terms and conditions of the Hire Savannah Policy.

The undersigned hereby agrees to the terms and conditions set forth in this agreement.

Company Name:_____

Company Address:_____

Company Official/Representative:_____

Position Title:_____

Authorizing Signature:_____

Date:_____

Project Name: Travis Field Water Reclamation Facility

Project Number: SW-524-10

Contractor: _____

GOOD FAITH EFFORT LOG (Form 00 1310-7)

Certifying Agency	Subcontractor	Phone	Contact Name	Initial Contact Date	Follow-up Contact Date	Solicited By Phone	Solicited By Fax	Solicited By Email	Comments and Quotes

SECTION 00 1310
DISADVANTAGED BUSINESS EMPLOYMENT PROVISIONS

The City of Savannah actively encourages employment and participation of small and disadvantaged businesses in all City contracts. Attention of the bidders is called to contract conditions contained herein pertaining to non-discrimination, equal employment opportunity, subcontracts, and opportunities for project area residents.

It is the policy of the City of Savannah that disadvantaged business enterprises (DBEs) be given fair opportunity to participate in the performance of services for the City, and that prime contractors utilize DBE subcontractors and suppliers to the fullest extent possible consistent with the efficient performance of the contract. The City of Savannah has established a 20% DBE goal for this project.

In order to determine compliance, bidders shall **submit the following completed documents in a separate sealed envelope** clearly marked with the bid number, project name and number and **marked (Section 00 1310 Disadvantaged Business Employment Provisions)** with their bid:

1. Non-discrimination statement (Sec. 00 1310-3) and;
2. Proposed schedule of disadvantaged business enterprise participation (Sec. 00 1310-4) and;
3. Documentation of Good Faith Efforts **[Submit only if the goals are not met.]**

Failure to submit the required documents shall result in the bid not being read or considered.

Suggestions to help meet the goal:

- ✓ Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation of DBEs.
- ✓ Advertising in general circulation media, trade association publications, or disadvantaged business enterprise media to solicit bids from DBE subcontractors or suppliers. **[Advertisement should appear at least 10 days prior to bid due date, unless the City's solicitation period is shortened.]**
- ✓ Designating portions of the work for DBE subcontracting in trades with established availability of DBE subcontractors.
- ✓ Providing a minimum of 10 days notice prior to the Bid due date to DBEs when requesting bids or proposals for furnishing material or services as a subcontractor or supplier.

Any attempt to submit false information, will result in a recommendation that the bidder be debarred from participating in future City contracts.

The contractor is required to fulfill any DBE utilization commitments made unless good cause is demonstrated for any failure to fulfill such commitment. **Written approval is required prior to**

any substitution.

The contractor will maintain records and information necessary to document compliance with Good Faith Effort requirements, and the City shall have the right to inspect such records.

Any DBE listed in the completed form entitled "Proposed Schedule of DBE Participation" (Section 00 1310-4) must be certified by an approved agency such as USDOT, GDOT, or SBA 8(a) prior to the due date of this bid. Proof of DBE certification such as a certificate or letter from the certifying agency is required to accompany the bid. A firm that has submitted an application for DBE certification or an application for DBE certification under review but has not been certified is not qualified as a certified DBE and will not be recognized as such during the City's evaluation process.

No bidder shall enter into an agreement with any DBE that would in any way limit the DBE's opportunities to sell to, or act as subcontractor for, any other party. Violation of this requirement would be grounds to deem the bidder non-responsive to this bid solicitation.

The following resources are available to aid bidders in complying with this section:

The State of Georgia Department of Transportation maintains a website listing of Disadvantaged Business Enterprises located at www.dot.ga.gov/PS/Business/DBE

Chatham County Purchasing Department maintains a listing of Disadvantaged Business Enterprises to include Contractors, Consultants and Suppliers. Contact (912) 652-7860.

GA Tech Procurement Assistance Center maintains a listing of Disadvantaged Business Enterprises to include Contractors, Consultants and Suppliers. Contact (912) 963-2524.

Savannah/Hilton Head International Airport Commission maintains a listing of Disadvantaged Business Enterprises to include Contractors, Consultants and Suppliers. Contact (912) 964-0514 or visit the website at www.savannahairport.com

Small Business Assistance Corporation maintains a listing of Disadvantaged Business Enterprises to include Contractors, Consultants and Suppliers. Contact (912) 232-4700 or visit the website at www.sbacsav.com.

NON-DISCRIMINATION STATEMENT

The prime contractor / bidder certifies that:

(1) No person shall be excluded from participation in, denied the benefit of, or otherwise discriminated against on the basis of race, color, national origin, or gender in connection with any bid submitted to the City of Savannah or the performance of any contract resulting therefrom;

(2) That it is and shall be the policy of this Company to provide equal opportunity to all business persons seeking to contract or otherwise interested in contracting with this Company, including those companies owned and controlled by racial minorities, cultural minorities, women, and individuals belonging to other socially and economically disadvantaged groups;

(3) In connection herewith, we acknowledge and warrant that this Company has been made aware of, understands and agrees to take affirmative action to provide such companies with the maximum practicable opportunities to do business with this Company;

(4) That this promise of non-discrimination as made and set forth herein shall be continuing in nature and shall remain in full force and effect without interruption;

(5) That the promises of non-discrimination as made and set forth herein shall be and are hereby deemed to be made as part of and incorporated by reference into any contract or portion thereof which this Company may hereafter obtain and;

(6) That the failure of this Company to satisfactorily discharge any of the promises of non-discrimination as made and set forth herein shall constitute a material breach of contract entitling the City of Savannah to declare the contract in default and to exercise any and all applicable rights and remedies including but not limited to cancellation of the contract, termination of the contract, suspension and debarment from future contracting opportunities, and withholding and or forfeiture of compensation due and owing on a contract.

_____ _____

Signature Title

PROPOSED SCHEDULE OF DBE PARTICIPATION

Any DBE listed in this completed form must be certified by an approved agency such as USDOT, GDOT, or SBA 8(a) prior to the due date of this bid. Proof of DBE certification such as a certificate or letter from the certifying agency is required to accompany the bid. A firm that has submitted an application for DBE certification or an application for DBE certification under review but has not been certified is not qualified as a certified DBE and will not be recognized as such during the City's evaluation process.

Name of Bidder/Proposer:_____ Bid No. _____

Project Title: Travis Field Water Reclamation Facility (SW-524-10)

NOTE: Proof of DBE certification must be attached to this completed form for all firms listed in the table below.

Name of DBE Participant	Telephone	Email	Address (City, State)	DBE? (Y/N)	Type of Work Sub-Contracted	Sub-contract Value (%)	Sub-contract Value ($)
						%	
						%	
						%	
						%	
						%	
						%	
						Total Base Bid	$
						Total Proposed DBE Subcontracts	$
						Bidder's Proposed DBE Participation	%

The undersigned will enter into a formal agreement with the DBE Subcontractors/Proposers identified herein for work listed in this schedule conditioned upon executing of a contract with the Mayor and Aldermen of the City of Savannah. The Prime's subcontractors' subcontractors must enter into a formal agreement with the tier subcontractor identified herein for work listed in this schedule. It is the responsibility of the Prime contractor to ensure compliance by all subcontractors.

Joint Venture Disclosure

If the prime bidder is a joint venture, please describe below the nature of the joint venture and level of work and financial participation to be provided by the disadvantaged joint venture firm.

Joint Venture Firms	Level of Work	Financial Participation

Printed name (company officer or representative): _____

Signature: _____

Title: _____ Email: _____

Telephone: _____ Fax: _____

Rev.03/18

Disadvantaged Business Enterprise

GOOD FAITH EFFORT

Prime Company Name _____ Bid Date _____

Travis Field Water Reclamation Facility (SW-524-10)
Project Name

Event Number _____

If you have failed to secure DBE participation or if your DBE participation is less than the City's project goal, you MUST complete this form.

If the bidder's method of compliance with the DBE goal is based upon demonstration of a good faith effort, the bidder will have the burden of correctly and accurately preparing and submitting the documentation required by the City. Compliance with each item, 1 through 4 below, shall satisfy the Good Faith Effort requirement absent proof of fraud, intentional and/or knowing misrepresentation of the facts or intentional discrimination by the bidder.

This form must be submitted in its entirety with supporting documentation in a separate sealed envelope with your bid prior to the time of bid opening. Failure to comply will result in the bid being considered non-responsive and the bid will not be read or considered.

1.) Please list each and every subcontracting and/or supplier opportunity (DO NOT LIST NAMES OF FIRMS) which will be used in completion of this project, regardless of whether it is to be provided by a DBE or non DBE.

(Use additional sheets, if necessary)

List of: Subcontracting Opportunities	List of: Supplier Opportunities

Rev.03/18

2.) Did you obtain a current list of DBE firms?

_____ Yes Date of Listing _____/_____/_____.

_____ No Source_____

3.) Please indicate subcontract or supplier list categories for which potential DBE bidder lists were provided? Provide detail of how these DBEs were solicited.

_____ _____

_____ _____

_____ _____

4.) **Please attach the following:**

(1) Completed Good Faith Effort Log see: 00 1310-7 Log

(2) Evidence of solicitation to prospective DBE firms, such as advertisements, copies of solicitation letters, faxes, emails and other to substantiate efforts.

DEMONSTRATION OF GOOD FAITH EFFORTS MUST INCLUDE ALL ITEMS OUTLINED IN THIS SECTION.

FEDERAL EQUAL OPPORTUNITY PROVISIONS

106 FC-2 THRU 106 FC-9

Section 00 1320

Section 00 1320
Federal Equal Opportunity Provisions
106 FC-2 thru106 FC-9

106- FC-2 DISCRIMINATION PROHIBITED

a. In all hiring or employment made possible by or resulting from this contract, there (1) will not be any discrimination against any employee or applicant for employment because of race, color, sex or national origin, and (2) affirmative action will be taken to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex or national origin. This requirement shall apply to, but not to be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising; lay-off or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. There shall be posted in conspicuous places available to employees and applicants for employment notices to be provided by HUD setting forth the provisions of this clause. All solicitations or advertisements for employees shall state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.

b. No person in the United States shall, on the ground of race, color, or religion, be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity made possible by or resulting from this Contract. The Contractor and each employer will comply with all requirements imposed by or pursuant to the regulations effectuating Title VI of the Civil Rights Act of 1964.

FC-3 EQUAL EMPLOYMENT OPPORTUNITY

1. As used in these specifications:

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

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

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

d. "Minority" includes:

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

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

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

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

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

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

4. The Contractor shall implement the specific affirmative action standard provided in paragraphs 7a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. The Contractor is expected to make substantially uniform toward its goals in each craft during the period specified.

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

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

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

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

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

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

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

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

funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the source compiled under 7b above.

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

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

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

i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. No later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

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

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

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

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

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

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

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

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

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

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

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

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11245, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs.

Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246 as amended.

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

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation, if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that the existing records satisfy this requirement, contractors shall not be required to maintain separate records.

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

16. The Contractor shall furnish all information and reports required by the City or its representative, and shall permit access to any books, records, and accounts for purposes of investigation to ascertain compliance with the program.

17. The Contractor shall take such action with respect to any Subcontractor as the City may direct as a means of enforcing the provisions of paragraphs 1

through 20 herein, including penalties and sanctions for non-compliance, provided, however, in the event the Contractor becomes involved or threatened with litigation as the result of such direction by the City, the City will enter into such litigation as is necessary to protect the interests of the City and to effectuate the City's Equal Employment Opportunity Program and in the case of contracts receiving Federal assistance, the Contractor or the City may request the United States to enter into such litigation to protect the interests of the United States.

18. The Contractor shall and cause each Subcontractor, if any, to file compliance reports with the City in the form and to the extent prescribed by the City or its representative. Compliance reports filed at such time as directed shall contain information as to the employment practices, policies, programs and statistics of the Contractor and any Subcontractor.

19. Refusal or failure of a prospective Contractor to comply with the provisions of this selection as applicable at the time of bidding as to the Contractor or a prospective Subcontractor, shall result in that Contractor not being considered a responsible bidder and may result in the rejection of the bid, or if such failure or refusal is discovered after award of the contract, the Contractor or Subcontractor shall be subject to the provisions of Subsection 20 below.

20. Refusal by the Contractor or Subcontractor to comply with any part on or of this program as herein stated and described will subject the offending party to any or all of the following penalties:

a. Withholding all future payments under the involved public contract to the party in violation until it is determined that the party is in compliance with the provisions of the contract.

b. Refusal of all future bids where a party is a Contractor or Subcontractor under any public contract with the City of Savannah or any of its departments or divisions until such time as the Contractor demonstrates that the policy outlines shall be complied with by each party.

c. In cases in which there is substantial or material violation or the threat of substantial or material violation of the compliance procedure, or as may be provided for by contract, appropriate proceedings may be brought to enforce those provisions, including the enjoining, within applicable laws, of Contractors, Subcontractor, or other organizations, individuals or groups who prevent directly, indirectly, or seek to prevent directly or indirectly compliance with the policy, as herein outlined.

21. As used herein, the term "Subcontractor" shall be used as the singular or plural and refer to any party who provides the Contractor with supplies, materials or workmanship of $10,000 or more under the contract.

FC-4 SUBCONTRACT

None of the work or services covered by this contract shall be subcontracted hereunder after the award of a contract without the prior written approval of the City. Any work or services subcontracted hereunder shall be specified by written contract or agreement and shall be subject to each provision of this contract. Contractors are encouraged to hire local Subcontractors and procure from local suppliers as provided in chapter 11-102 of the City Code.

FC-5 OPPORTUNITIES FOR RESIDENTS (SECTION 3 OF HUD ACT OF 1968)

A. The work to be performed under this contract is on a project assisted under a program providing direct Federal financial assistance from the Department of Housing and Urban Development and is subject to the requirements of section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 170lu. Section 3 requires that to the greatest extent feasible opportunities for training and employment be given lower income residents of the project area and contracts for work in connection with the project be awarded to business concerns which are located in, or owned in substantial part by persons residing in the area of the project.

B. The parties to this contract will comply with the provisions of said Section 3 and the regulations issued pursuant thereto by the Secretary and applicable rules and orders of the Department issued thereunder prior to the execution of this contract. The parties to this contract certify and agree that they are under no contractual or other disability which would prevent them from complying with these requirements.

C. The contractor will send to each labor organization or representative of works with whom he has a collective bargain-agreement or other contract or understanding, if any, a notice advising the said labor organization or workers' representative of his commitments under this Section 3 clause and shall post copies of the notice in conspicuous places available to employees and applicants for employment or training.

D. The contractor will include this Section 3 clause in every subcontract for work in connection with the project and will, at the direction of the applicant for or recipient of Federal financial assistance, take appropriate action pursuant to the subcontract upon a finding that the subcontractor is in violation of regulations issued by the Secretary of Housing and Urban Development, 24 CFR Part 135. The contractor will not subcontract with any subcontractor where it has notice or knowledge that the letter has been found in violation of regulations under 24 CFR Part 135 and will not let any subcontract unless the subcontractor has first provided it with a preliminary statement of ability to comply with the requirements of these regulations.

E. Compliance with the provisions of Section 3, the regulations set forth in 24 CFR Part 135, and all applicable rules and orders of the Department issued

thereunder prior to the execution of the contract, shall be a condition of the Federal financial assistance provided to the project, binding upon the applicant or recipient for such assistance, its successors, and assigns. **Failure to fulfill these requirements shall subject the applicant or recipient, its contractors and subcontractors, its successors, and assigns to those sanctions specified by the grant or loan agreement or contract** through which Federal assistance is provided, and to such sanctions as are specified by 24 CFR Part 135.

FC-6 COMPLIANCE WITH AIR AND WATER ACTS

This contract is subject to the requirements of the Clean Act, as amended, 42 USC 1857 et seq., The Federal Water Pollution Control Act, as amended, 33 USC 1251 et seq., and the regulations of the Environmental Protection Agency with respect thereto, at 40 CRF Part 15, as amended from time to time.

In compliance with said regulations:

1. The Contractor shall require of subcontractors that any facility to be utilized in the performance of any nonexempt contract or subcontract is not listed on the List of Violating Facilities issued by the Environmental Protection Agency (EPA) pursuant to 40 CFR 15.20.

2. The Contractor will comply with all the requirements of Section 114 of the Clean Air Act, as amended, (330 USC 1318) relating to inspection, monitoring, entry, reports, and information as well as all other requirements specified in said Section 114 and Section 308, and all regulations and guidelines issued thereunder.

3. The Contractor will provide prompt notice of any notification received from the Director, Office of Federal Activities, EPA, indicating that a facility utilized or to be utilized for the contract is under consideration to be listed on the EPA List of Violating Facilities.

4. The Contractor will include, or cause to be included, the criteria and requirements to paragraphs (1) through (4) of this section in every nonexempt subcontract and take action as the Government will direct as a means of enforcing such provisions.

FC-7 NON-SEGREGATED FACILITIES:

A. Certification of Non-Segregated Facilities, as required by the May 8, 1967 order (32 F.R. 7439, May 19 1967), on elimination of Segregated Facilities, by the Secretary of Labor must be submitted prior to the award of this subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity clause.

B. A Certification of Non-Segregated Facilities, as required by the May 19,

1967 order (32 F.R., 7439, May 1967), on elimination of Segregated Facilities, by the Secretary of Labor must be submitted by the Contractor prior to the award of this contract.

C. Contractor's receiving subcontract awards exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide for the forwarding of this Notice to Prospective Subcontractors for supplies and construction contracts where the subcontracts exceed $10,000 and are not exempt from the provisions of the Equal Opportunity Clause.

FC-8 INTEREST OF CERTAIN FEDERAL OFFICIALS

No member of or Delegate to the Congress of the United States, and no resident commissioner, shall be admitted to any share or part of this contract or any benefit to arise therefore, but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.

INTEREST OF MEMBERS, OFFICERS, OR EMPLOYEES OF THE CITY, MEMBERS OF LOCAL GOVERNING BODY OR OTHER PUBLIC OFFICIALS

No member, officers, or employee of the City of Savannah or its designees or agents, no member of the governing body of the locality in which the program is situated, and no other public official of such locality or localities who exercises any functions or responsibilities with respect to the program during his tenure or for one year thereafter, shall have any interest, direct or indirect, in any contract or subcontract, or the proceeds thereof, for work to be performed in connection with the program.

FC-9 LEAD-BASED PAINT PROHIBITED

The use of lead-based paint on any surface of any residential structure is prohibited. Residential structure means any house, apartment or structure where persons reside, including a day care center, senior citizens center, community facility, etc., ". . . with respect to paint which is manufactured after June 22, 1977. Lead-based paint means any paint containing more than six one-hundredths of one percent lead by weight (calculated as lead metal) in the total non-volatile content of the paint, or the equivalent measure of lead in the dried film of paint already applied."

SECTION 00 1330

FEDERAL LABOR STANDARDS PROVISIONS

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

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

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible, place where it can be easily seen by the workers.

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

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

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

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

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

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

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

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

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

2. Withholding. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same

prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work, all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

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

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

subcontractors. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149.)

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

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

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

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

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

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

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

4. Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State

Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

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

less than the applicable wage rate on the wage determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

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

6. Subcontracts. The contractor or subcontractor will insert in any subcontracts the clauses contained in subparagraphs 1 through 11 of this paragraph A and such other clauses as HUD or its designee may by appropriate instructions require, and a copy of the applicable prevailing wage decision, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this paragraph.

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

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

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

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

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

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1 01 0, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part: "Whoever, for the purpose of . . . influencing in any way the action of such Administration..... makes, utters or publishes any statement knowing the same to be false..... shall be fined not more than $5,000 or imprisoned not more than two years, or both."

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

B. Contract Work Hours and Safety Standards Act. The provisions of this paragraph B are applicable only where the amount of the prime contract exceeds $100,000. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in sub paragraph (1) of this paragraph.

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

satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

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

C. Health and Safety. The provisions of this paragraph C are applicable only where the amount of the prime contract exceeds $100,000.

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

(2) The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, 40 USC 3701 et seq.

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

ATTACHMENT TO FEDERAL LABOR STANDARDS PROVISIONS

3.1 THROUGH 3.11

Section 00 1340

Section 00 1340

ATTACHMENT TO FEDERAL LABOR STANDARDS PROVISIONS

SO-CALLED "ANTI-KICKBACK ACT" AND REGULATIONS PROMULGATED PURSUANT THERETO BY THE SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR

TITLE 18, U.S.C., SECTION 874

(Replaces section 1 of the Act of June 13, 1934)
(48 Stat. 948, 40 U.S.C., sec 276b)
pursuant to the Act of June 25, 1948, 62 Stat. 862)

KICKBACKS FROM PUBLIC WORKS EMPLOYEES

Whoever, by force, intimidation, or threat of procuring dismissal from employment, or by any other manner whatsoever induces any person employed in the construction, prosecution, completion or repair of any public building, public work, or building or work financed in whole or in part by loans or grants from the United States, to give up any part of the compensation to which he is entitled under his contract of employment, shall be fined not more than $5,000 or imprisoned not more than five years, or both.

SECTION 2 OF THE ACT OF JUNE 13, 1934, AS AMENDED
(48 Stat. 948, 62 Stat. 862, 63 Stat. 108)
(72 Stat. 967, 40 U.S.C., sec 276c)

The Secretary of Labor shall make reasonable regulations for contractors and subcontractors engaged in the construction, prosecution, completion or repair of public buildings, public works or buildings or works financed in whole or in part by loans or grants from the United States, including a provision that each contractor and subcontractor shall furnish weekly a statement with respect to the wages paid each employee during the preceding week. Section 1001 of Title 18 (United States Code) shall comply to such statements.

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Pursuant to the aforesaid Anti-Kickback Act, the Secretary of Labor, United States Department of Labor, has promulgated the regulations hereinafter set forth, which regulations are found in Title 29, Subtitle A, Code of Federal Regulations, Part 3. The term "this part", as used in the regulations hereinafter set forth, refers to Part 3 last above mentioned. Said regulations are as follows:

SECTION 3.3 WEEKLY STATEMENT WITH RESPECT TO PAYMENT OF WAGES

(a) As used in this section, the term "employees" shall not apply to persons in classifications higher than that of laborer or mechanic and those who are the immediate supervisors of such employees.

(b) Each contractor or subcontractor engaged in the construction, prosecution, completion, or repair of any public building or public work, or building or work financed in whole or in part by loans or grants from the United States, shall furnish each week a statement with respect to the wages paid each of its employees engaged on work covered by 29 CFR Parts 3 and 5 during the preceding weekly payroll period. This statement shall be executed by the contractor or subcontractor who supervises the payment of wages, and shall be on form WH 348, "Statement of Compliance", or on an identical form on the back of WH 347, "Payroll (For Contractors Optional Use)" or on any form with identical wording. Sample copies of WH 347 and WH 348 may be obtained from the Government contracting or sponsoring agency, and copies of these forms may be purchased at the Government Printing Office.

(c) The requirement of this section shall not apply to any contract of $2,000 or less.

(d) Upon a written finding by the head of a Federal agency, the Secretary of Labor may provide reasonable limitation, variations, tolerances, and exemptions from the requirements of this section subject to such conditions as the Secretary of Labor may specify.

(29 F.R. 95, Jan. 4, 1964, AS AMENDED AT 33 F.R. 10186, JULY 17, 1968)

SECTION 3.4 SUBMISSION OF WEEKLY STATEMENTS AND THE PRESERVATION AND INSPECTION OF WEEKLY PAYROLL RECORDS

(a) Each weekly statement required under 3.3 shall be delivered by the contractor or subcontractor, within seven days after the regular payment date of the payroll period, to a representative of a Federal or State agency in charge at the site of the building or work, or, if there is no representative of a Federal or State agency at the site of the building or work, the statement shall be mailed by the contractor or subcontractor, within such time, to a Federal or State agency contracting for or financing statement, or a copy thereof, shall be kept available, or shall be transmitted together with a report of any violation, in accordance with applicable procedures prescribed by the United States Department of Labor.

(b) Each contractor or subcontractor shall preserve his weekly payroll records for a period of three years from date of completion of the contract. The payroll records shall set out accurately and completely the name and address of each laborer and mechanic, his correct classification, rate of pay, daily and weekly number of hours worked, deductions made, and actual wage paid. Such payroll records shall be made available at all times for inspection by the contracting officer of his authorized representative and by the authorized representatives of the Department of Labor.

SECTION 3.5 PAYROLL DEDUCTIONS PERMISSIBLE WITHOUT APPLICATION TO OR APPROVAL OF THE SECRETARY OF LABOR

Deductions made under the circumstances or in the situations described in the paragraphs of this section may be made without application to and approval of the Secretary of Labor.

(a) Any deduction made in compliance with the requirements of Federal, State, or local law, such as Federal or State withholding income taxes and Federal Social Security taxes.

(b) Any deduction of sums previously paid to the employee as a bona fide prepayment of wages when such repayment is made without discount or interest. A "bona fide prepayment of wages" is considered to have been made only when cash or its equivalent has been advanced to the person employed in such manner as to give him complete freedom of disposition of the advanced funds.

(c) Any deduction of amounts required by court proceed to be paid to another unless the deduction is in favor of the contractor, subcontractor or any affiliated person, or when collusion or collaboration exists.

(d) Any deduction constituting a contribution on behalf of the person employed to funds established by the employer or representatives of employees, or both, for the purpose of providing either from principal or income, or both, medical or hospital care, pensions or annuities on retirement, death benefits, compensation for injuries, illness, accidents, or unemployment benefits, vacation pay, saving accounts, or similar payments for the benefit of employees, their families and dependents: Provided, however, that the following standards are met: (1) the deduction is not otherwise prohibited by law; (2) it is either: (i) voluntarily consented to be done and such consent is not a condition either for the obtaining of or for the continuation of employment, or (ii) provided for in a bona fide collective bargaining agreement between the contractor or subcontractor and representatives of its employees; (3) no profit or other benefit is otherwise obtained, directly or indirectly, by the contractor or subcontractor or any affiliated person in the form of commission, dividend, or otherwise; and (4) the deductions shall serve the convenience and interest of the employee.

(e) Any deduction contributing toward the purchase of United States Defense Stamps and Bonds when voluntarily authorized by the employee.

(f) Any deduction requested by the employee to enable him to repay loans to or to purchase shares in credit unions organized and operated in accordance with Federal and State credit unions statutes.

(g) Any deduction voluntarily authorized by the employee for the making of contributions to governmental or quasi-governmental agencies, such as the American Red Cross.

(h) Any deduction voluntarily authorized by the employee for the making of contributions to Community Chests, United Givers Funds, and similar charitable organizations.

(i) Any deductions to pay regular union initiation fees and membership dues, not including fines or special assessments: Provided, however, that a collective bargaining agreement between the contractor or subcontractor and representatives of its employees provides for such deductions and the deductions are not otherwise prohibited by law.

(j) Any deduction not more than for the "reasonable cost" of board, lodging, or other facilities meeting the requirements of section 3(m) of the Fair Labor Standards Act of 1938, as amended, and Part 531 of this title. When such a deduction is made the additional records required under 526.27(a) of this title shall be kept.

SECTION 3.6 PAYROLL DEDUCTIONS PERMISSIBLE WITH THE APPROVAL OF THE SECRETARY OF LABOR

Any contractor or subcontractor may apply to the Secretary of Labor for permission to make any deduction not permitted under 3.5. The Secretary may grant permission whenever he finds:

(a) The contractor, subcontractor, or any affiliated person does not make a profit or benefit directly or indirectly from the deduction either in the form of a commission, dividend, or otherwise;

(b) The deduction is not otherwise prohibited by law;

(c) The deduction is either (1) voluntarily consented to by the employee in writing and in advance of the period in which the work is to be done and such consent is not a condition either for the obtaining of employment or its continuance, or (2) provided for in a bona fide collective bargaining agreement between the contractor or subcontractor and representatives of its employees; and

(d) The deduction serves the convenience and interest of the employee.

SECTION 3.7 APPLICATIONS FOR THE APPROVAL OF THE SECRETARY OF LABOR

Any application for the making of payroll deductions under 3.6 shall comply with the requirements prescribed in the following paragraphs of this section:

(a) The application shall be in writing and shall be addressed to the Secretary of Labor.

(b) The application shall identify the contract or contracts under which the work in question is to be performed. Permission will be given for deductions only on specification, identified contracts, except upon a showing of exceptional circumstances.

(c) The application shall state affirmatively that there is compliance with the standards set forth in the provisions of 3.6. The affirmation shall be accompanied by a full statement of the facts indicating such compliance.

(d) The application shall include a description of the proposed deduction, the purpose to be served thereby, and the classes of laborers or mechanics from whose wages the proposed deduction would be made.

(e) The application shall state the name and business of any third person to whom any funds obtained from the proposed deductions are to be transmitted and the affiliation of such person, if any, with the applicant.

SECTION 3.8 PROHIBITED PAYROLL DEDUCTIONS

Deductions not elsewhere provided for by this part and which are not found to be permissible under 3.6 are prohibited.

SECTION 3.09 METHODS OF WAGES

The payment of wages shall be by cash, negotiable instruments payable on demand, or the additional forms of compensation for which deductions are permissible under this part. No other methods of payment shall be recognized on work subject to the Copeland Act.

SECTION 3.10 REGULATIONS PART OF CONTRACT

All contracts made with respect to the construction, prosecution, completion, or repair of any public building or public work or building or work financed in whole in part by loans or grants from the United States covered by the regulations in this part shall expressly bind the contractor or subcontractor to comply with such of the regulations in this part as may be applicable. In this regard, see 5.5 (a) of this subtitle.

TITLE 29 - LABOR

Subtitle A - Office of the Secretary of Labor

PART 3 - CONTRACTORS AND SUBCONTRACTORS ON PUBLIC BUILDING OR PUBLIC WORK FINANCED IN WHOLE OR IN PART BY LOANS OR GRANTS FROM THE UNITED STATES

SECTION 3.1 PURPOSE AND SCOPE

This part prescribes "anti-kickback" regulations under section 2 of the Act of June 13, 1934, as amended (40 U.S.C. 276c), popularly known as the Copeland Act. This part applies to any contract which is subject to Federal wage standards and which is for the construction, prosecution, completion, or repair of public buildings, public works or buildings or works financed in whole or in part by loans or grants from the United States.

The part is intended to aid in the enforcement of the minimum wage provisions of the Davis-Bacon Act and the various statutes dealing with Federally-assisted construction that contain similar minimum wage provisions, including those provisions which are not subject to Reorganization Plan No. 14 (e.g., the College Housing Act of 1950, the Federal Water Pollution Control Act, and the Housing Act of 1959), and in the enforcement of the overtime provisions of the Contract Work Hours Standards Act whenever they are applicable to construction work. The part details the obligation of contractors and subcontractors relative to the weekly submission of statements regarding the wages paid on work covered thereby; sets forth the circumstances and procedures governing the making of payroll deductions from the wages of those employed on such work; and delineates the methods of payments permissible on such work.

SECTION 3.2 DEFINITIONS

As used in the regulations in this part:

(a) The term "building" or "work" generally includes construction activity as distinguished from manufacturing, furnishing of materials, or servicing and maintenance work. The terms include, without limitation, buildings, structures, and improvements of all types, such as bridges, dams, plants, highways, parkways, streets, subways, tunnels, sewers, mains, power lines, pumping stations, railways, airports, terminals, docks, piers, wharves, ways, lighthouses, buoys, jetties, breakwaters, levees, and canals; dredging, shoring, scaffolding, drilling, blasting, excavating, clearing and landscaping. Unless conducted in connection with and at the site of such a building or work as is described in the forgoing sentence, the manufacture or furnishing of materials, articles, supplies or equipment, (whether or not a Federal or State agency acquires title to such materials, articles, supplies, or equipment during the course of the manufacture or furnishing, or owns the materials from which they are manufactured or furnished) is not a "building" or "work" within the meaning of the regulations in this part.

(b) The terms "construction", "prosecution", "completion", or "repair", means all types of work done on a particular building or work at the site there of, including, without limitation, altering, remodeling, painting and decorating, the transporting of material and supplies to or from the building or work by the employees of the construction contractor or construction subcontractor, and the manufacturing or furnishing of materials, articles, supplies, or equipment on the site of the building or work, by persons employed at the site by the contractor or subcontractor.

(c) The terms "public buildings" or "public work" include building or work for whose construction prosecution, completion, or repair, as defined above, a Federal agency is a contracting party, regardless of whether title thereof is in a Federal agency.

(d) The term "building or work financed in whole or in part by loans or grants from the United States" includes building or work for whose construction, prosecution, completion, or repair, as defined above, payment of part payment is made directly from funds provided by loans or grants by a Federal agency. The term does not include building or work for which Federal assistance is limited solely to loan guarantees or insurance.

(e) Every person paid by a contractor or subcontractor in any manner for his labor in the construction, prosecution, completion, or repair of a public building or public work or building or work financed in whole or in part by loans or grants from the United States is "employed" and receiving between him and the real employer.

(f) The term "any affiliated person" includes a spouse, child, parent, or other close relative of the contractor or subcontractor; a partner or officer of the contractor or subcontractor; a corporation closely connected with the contractor or subcontractor as parent, subsidiary or otherwise, and an officer or agency of such corporation.

(g) The term "Federal agency" means the United States, the District of Columbia, and all executive departments, independent establishments, administrative agencies, and instrumentalities of the United States and of the District of Columbia, including corporation, all or substantially all of the stock of which is beneficially owned by the United States, by the District of Columbia, or any of the foregoing departments, establishments, agencies, and instrumentalities.

Section 00 1350

CITY OF SAVANNAH
BUREAU OF PUBLIC DEVELOPMENT
GENERAL SPECIFICATIONS AND CONDITIONS FOR COMMUNITY DEVELOPMENT BLOCK GRANT CONTRACTS WITH CONTRACTORS

INDEX TO
SECTION 00 1350 - COMMUNITY DEVELOPMENT BLOCK GRANT CONTRACTS

Section 00 1350

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
COMMUNITY DEVELOPMENT BLOCK GRANT
SUPPLEMENTARY GENERAL CONDITIONS
FOR CONTRACTS WITH CONTRACTORS

The following conditions take precedence over any conflicting conditions in the Contract:

SEC. 1. APPLICATION TO SUBCONTRACTORS

No money under this Contract shall be disbursed by the Contractor to any sub-contractor or agency except pursuant to a written contract which incorporates the conditions listed below to the extent they are applicable.

SEC. 2. DEFINITIONS

As used in this Contract:

"HUD" means the Secretary of Housing and Urban Development or a person authorized to act on his behalf.

"City" means the Mayor and Aldermen of the City of Savannah or a person authorized to act in their behalf.

"Act" means Title I of the Housing and Community Development Act of 1974, as amended, unless otherwise specified.

SEC. 3. RECORDS

A. Records to be Kept - Records shall be maintained in accordance with requirements prescribed by HUD or the City with respect to all matters covered by this Contract. Except as otherwise authorized by HUD, such records shall be maintained for a period of three years after receipt of the final payment under this contract.

B. Documentation of Costs - All costs shall be supported by properly executed payrolls, time records, invoices, contracts, vouchers, orders, or other accounting documents. All documents pertaining in whole or in part to this Contract shall be clearly identified and readily accessible.

C. Inspection of Records - At any time during normal business hours and as often as the City, HUD and/or the Comptroller General of the United States may deem necessary, the Contractor shall make available to the City, HUD and/or representatives of the Comptroller General for examination all of its records, with respect to all matters covered by this Contract, and will permit the City, HUD and/or representatives of the Comptroller General to audit, examine and make excerpts or transcripts from such records including contracts, invoices, materials, payrolls, records of personnel, conditions of employment and any other data relating to matters covered by this Contract.

SEC. 4. COPYRIGHTS

If this contract results in a book or other copyrightable material, the author is free to copyright the work; but HUD and the City reserve a royalty-free, non-exclusive, and irrevocable license to reproduce, publish, or otherwise use, and to authorize others to use, all copyrighted material and all material which can be copyrighted.

SEC. 5. PATENTS

Any discovery or invention arising out of, or developed in the course of, work aided by this Contract shall be promptly and fully reported to HUD for determination by HUD as to whether patent protection on such invention or discovery shall be sought and how the rights in the invention or discovery, including rights under any patent issued thereon, shall be disposed of and administered in order to protect the public interest.

SEC. 6. LOBBYING

This section applies to contracts in excess of $100,000. The Contractor certifies, to the best of his or her knowledge and belief, that:

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

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

(3) The Contractor shall require that the language of this certification be included in the award documents for all sub-awards at all tiers exceeding $100,000, including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements.

(4) This certification is a material representation of fact upon which reliance was placed when this Contract was made or entered into. Agreement to this certification is a prerequisite for making or entering into this Contract imposed by Section 1352, title 31, U.S. Code. Any person or agency who makes an expenditure prohibited by this section is subject to a civil penalty from $10,000 up to $100,000 for each failure. This penalty also applies to any person or agency who fails to submit or amend the disclosure form (LLL), when required. Failure to submit the required certification may result in payment under this contract being delayed or denied.

SEC. 7. DISCRIMINATION

Contractors shall comply with all relevant requirements of the following federal laws and regulations dealing with discrimination in federally-assisted programs:

(1) Title VI of the Civil Rights Act of 1964 (42 U.S.C. 20000d) which provides that no person shall, on the ground of race, color, or national origin, be excluded from employment or participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance.

(2) Section 109 of Title I of the Housing and Community Development Act of 1974, as amended (42 U.S.C. 5309) and regulations at CFR 570.602 which provide that no person shall on the grounds of race, color, national origin, or sex, be excluded from participation in, be denied the benefits of, be denied employment in, or be subjected to discrimination under any CDBG program or activity.

(3) Section 504 of the Rehabilitation Act of 1973, as amended, (29 U.S.C. 794) which provides that no otherwise qualified handicapped individual shall, solely by reason of his/her handicap, be excluded from the participation in, be denied the benefits of, be denied employment in, or be discriminated against under any program or activity receiving federal assistance.

(4) Age discrimination Act of 1975, as amended (42 U.S.C. 6101) which provides that no person shall, on the basis of age, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal assistance.

(5) Section 3 of the Housing and Urban Development Act of 1968, as amended (12 U.S.C. 1701u) which provides that, to the greatest extent possible, training and employment opportunities shall be made available to low-income residents of the unit of local government in which the project is located (i.e. the City of Savannah and Chatham County), and that contract and subcontracts be awarded to small businesses located within, or owned in substantial part by residents in the same area.

(6) Executive Order 11246, as amended by Executive Order 12086, and regulations in 41 CFR 60, which provides that no person shall be discriminated against on the basis of race, color, religion, sex, or national origin in all phases of employment during the performance of federally-assisted construction contracts and subcontracts. Contractors and subcontractors shall take affirmative action to ensure fair treatment in employment, including recruitment, training, promotion, demotion, transfer, layoff, termination, and pay.

SEC. 8. LABOR STANDARDS

A. All workers employed by Contractors or subcontractors on construction work costing over $2,000 and financed in whole or in part under this Contract shall be paid wages at rates not less than those prevailing on similar construction in the locality, as determined by the Secretary of Labor in accordance with the Davis-Bacon Act, as amended (40 U.S.C. 276a-276a.7). By reason of the foregoing requirement, the Contract Work Hours and Safety Standards Act (40 U.S.C. 327 et seq.) also applies. However, these requirements apply to the rehabilitation of residential property only if such property is designed for residential use of eight or more families.

B. In construction projects subject to the Davis-Bacon Act, Contractors and subcontractors shall submit weekly payroll information for each worker in the form prescribed by HUD, and shall post a notice listing the minimum wage rates at the work site or sites.

C. The Contractor shall comply with the Copeland "Anti-Kick Back Act" (18 U.S. C. 876) as supplemented in Department of Labor regulations (29 CFR Part 3). This Act provides that the Contractor shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which

he is otherwise entitled.

SEC. 9. LEAD-BASED PAINT

A. The use of lead-based paint in the federally-assisted construction or rehabilitation of residential structures is prohibited by Section 401(b) of the Lead-Based Paint Poisoning Prevention Act [42 U.S.C. 4831(b)] and regulations in 24 CFR 35B.

SEC. 10. USE OF DEBARRED, SUSPENDED OR INELIGIBLE CONTRACTORS

CDBG funds shall not be used directly or indirectly to employ, award contracts to, or otherwise engage the services of, or fund any contractor or sub-recipient during any period of debarment, suspension, or placement in ineligibility status under the provisions of 24 CFR Part 24. (Government Debarment and Suspension Regulations)

SEC. 11. CONFLICTS OF INTEREST

A. Conflicts Prohibited - Except for approved administrative or personnel costs, no person who is an employee, officer, agent, consultant, elected official or appointed official of the City or the Contractor and who exercises or has exercised any functions or responsibilities with respect to CDBG-assisted activities, or who is in a position to participate in a decision-making process or gain inside information with regard to such activities, may obtain any personal or financial interest or benefit from the activity, or have an interest in any contract, subcontract or agreement related thereto, or the proceeds thereof, either for himself/herself or those with whom he/she has family or business ties, during his/her employment or tenure or for one year thereafter.

B. Contractor's Responsibilities - The Contractor shall take appropriate steps to assure compliance with paragraph (A) of this section. It also agrees that it will incorporate the following provisions into every sub-contract:

> "Interest of Sub-Contractor and Employees: The Sub-contractor covenants that no person who presently exercises any functions or responsibilities in connection with the Community Development Block Grant Program has any personal financial interest, direct or indirect, in this Contract. Any interest on the part of the Sub-contractor or his employees must be disclosed to the Recipient and the City, provided, however, that this paragraph shall be interpreted in such a manner so as not to unreasonably impede the statutory requirement that maximum opportunity be provided for employment of and participation by residents of the area."

C. Exceptions - The City may request HUD to grant an exception to the provisions of paragraph (A) of this section, when it determines that such an exception will serve to further the purposes of the Act and the effective and efficient administration of the Contractor's program or project.

SEC. 12. DISPUTES, DEFAULT AND TERMINATION

A. Disputes - In the event of dispute arising under this Contract, the Contractor shall notify the City promptly in writing of his contentions and submit his claim. If the dispute arises before performance of the related work, the written notice shall be submitted prior to commencing such work. In any event, the Contractor shall proceed with such work in compliance with the instructions of the City; such compliance shall not be a waiver of the Contractor's rights to make a claim, provided he has notified the City in writing as above stipulated.

B. Default and Remedies

1. Default shall consist of any failure by the Contractor to perform under this Contract or written amendments thereto or any breach of any covenant, agreement, provision or warranty provided by the Contractor as a part of this Contract. Actions which constitute a default include, but are not limited to:

(i) Failure to submit to the City reports which are required pursuant to this Contract or the submission of required reports which are incorrect or incomplete.

(ii) Submission of requests for payment or reimbursement of amounts which are incorrect or incomplete.

(iii) The failure of the Contractor to accept any additional conditions which may be provided by law, by executive order, by regulation or by other policy announced by the City, the state or any federal agency.

(iv) Failure to perform any activity required by this Contract.

2. Upon occurrence of any default, the City shall advise the Contractor in writing of the action constituting the default, and specify the actions that must be taken to cure the default. The City may suspend payment under the contract. If a default is not cured within 30 days from receipt of written notice of such default by the Contractor, the City may continue the suspension or, by written notice of termination, may terminate the Contract.

3. Notwithstanding the above, the Contractor shall not be relieved of liability to the City for damage sustained by the City by virtue of any default or breach of the Contract; and the City may deduct the amount of damages from any outstanding payments to the Contractor or may withhold payments until such time as the exact amount of the damages is determined.

C. Termination

1. If federal funding for this project is terminated and no other funding is available for continuation of this project, the City will not be obligated to continue funding for the services contained in this contract and may terminate the Contract.

2. In the event of termination, all property and finished or unfinished documents, data, studies, surveys, drawings, maps, models, photographs and reports prepared by or purchased with Community Development funds by the Contractor under this Contract shall, at the option of the City, become its property and the Contractor shall be entitled to receive just and equitable compensation for any work satisfactorily completed hereunder.

SEC. 13. ASSIGNABILITY

The Contractor shall not assign any interest in this Contract, and shall not transfer any interest in the same (whether by assignment or novation) without the prior written consent of the City, provided, however, that claims for money due or to become due the Contractor from the City under this contract may be assigned to a bank, trust company, or other financial institution without such prior approval. Notice of any such assignment or transfer shall be furnished promptly to the City.

SEC. 14. OTHER RESPONSIBILITIES OF THE CONTRACTOR

A. Employment Status - It is understood by the Contractor that, in performing services in accordance with the terms and conditions of this Contract, it is so performing as an independent contractor and not as an employee of the City.

B. Taxes, Social Security and Government Reporting - Personal income tax payments, social security contributions, insurance and all other governmental reporting and contributions required as a consequence of the Contractor receiving compensation under this Contract shall be the sole responsibility of the Contractor.

C. Insurance - The Contractor shall secure and maintain such insurance as will protect him from claims under the Worker's Compensation Acts and from claims for bodily injury, death, or property damage which may arise from the performance of his services under this contract.

D. Professional Skills - It is understood and agreed that the Contractor employ persons skilled in the professional callings necessary to perform the work agreed to be performed by it under this Contract, that the City relies upon the skill of such employees to do and perform such work, and that acceptance by the City of the work performed does not operate as a release of the Contractor from its professional responsibility. If it is necessary for the Contractor to consult with appropriate outside specialists, they shall be retained at the cost and expense of the Contractor and at no additional cost to the City.

CONTRACT ADMINISTRATION FORMS

Administrative Outline	Section 00 1400
Organizational Flow Chart	Section 00 1405
Submittal Transmittal	Section 00 1410
Request for Substitution	Section 00 1415
Request for Periodic Payment	Section 00 1420
Stored Materials	Section 00 1425
Progress Report	Section 00 1430
Affidavit of Payment of Claims	Section 00 1435
DBE Participation Report	Section 00 1437
Change of DBE Subcontractor Form	Section 00 1438
Notice of Delay	Section 00 1440
Request for Facility Shut-Down	Section 00 1445
Contract Change Order	Section 00 1450
Request for Final Inspection	Section 00 1465
Statement of Surety Company	Section 00 1470
Contractor's Release	Section 00 1475
Notice of Final Acceptance	Section 00 1480
Responsibility for Shop Drawing Approval	Section 00 1490

Section 00 1400
ADMINISTRATION OUTLINE

This administration outline was developed to assist in the implementation of the Contract by establishing how the contract requirements are to be administered.

This outline does not supersede, modify, or replace any of the requirements of the General Conditions. Nothing in this outline shall alter those requirements. In the event of conflicts, provisions of the General Conditions shall govern.

The references listed are primary references. Further pertinent information may be found in unlisted references.

1. Pre-Construction Meeting

Attendees:
- Project Manager
- City Project Engineer
- Construction Inspector
- Design Engineer (Consultant)
- Contract Analyst
- Contractor
- Testing Lab (Optional)
- Utility Owners

Objective: Discuss construction related issues; issue Notice to Proceed.

2. Construction Schedule - (ref. Paragraphs 00 1500-32 & 00 1500-46)
(6 copies)

Progression:
- Contractor (submit)
- Design Engineer (Consultant)
- City Project Engineer
- Project Manager
- Construction Inspector (review)

Distribution:
- Project Manager-1
- City Project Engineer-1
- Construction Inspector-1
- Design Engineer (Consultant)-1
- Contractor-2

3. Material Submittals - (ref. Paragraph 00 1500-49)
(6 copies)

Forms: Submittal Transmittal (Section 00 1410)
Responsibility for Shop Drawing Approval (Section 00 1490)

Progression: Contractor (submit)
Design Engineer (Consultant) (review)
Construction Inspector (Review)
Project Engineer (review)
Department Head/Project Manager

Distribution (marked: no exceptions taken, or make corrections noted)

City Project Engineer-1
Project Manager-1
Contractor-2
Design Engineer (Consultant)-1
Construction Inspector-1

Distribution (marked: amend and resubmit, or rejected - see remarks)

City Project Engineer-1
Construction Inspector-1
Contractor-4

4. Request for Substitution (ref. Paragraph 00 1500-50)
(6 copies)

Forms: Request for Substitution (Section 00 1415)

Progression: Contractor (submit)
Design Engineer (Consultant)
Construction Inspector
City Project Engineer/Project Manager (review)
Construction Inspector
Contractor

Distribution (marked: Substitution Approved or Substitution Approved as Noted)

City Project Engineer-1
Design Engineer (Consultant)-1
Contractor-2
Project Manager-1
Construction Inspector-1

Distribution (marked: amend and resubmit, or rejected - see remarks)

Project Manager-1
Design Engineer (Consultant)-1
City Project Engineer-1
Construction Inspector-1
Contractor-4

5. Staging (ref. Paragraph 00 1500-61)
(3 copies)

Progression: Contractor (submit)
Construction Inspector (review)
Contractor

Distribution: Construction Inspector-1
Contractor-2

6. Periodic Payments (ref. Paragraphs 00 1500-74, 00 1500-75 & 00 1500-78)
(3 copies)

Forms: (unit price & lump sum contracts)
Request for Periodic Payment (Section 00 1420)
Stored Material (Section 00 1425)
Progress Report (Section 00 1430)
Updated Schedule
Affidavit of Payment of Claims (Section 00 1435)
DBE Participation Report (Section 00 1437)

Progression: Contractor (submit)
Design Engineer (Consultant)
Construction Inspector (approval)
City Project Engineer (approval)
Contract Analyst (payment procedure)
Project Manager
Contract Analyst
Finance (payment)
Contractor

Distribution: Construction Inspector-1
Contract Analyst-1
Finance-1

Contents (unit price & lump sum contracts):

1. Request for Periodic Payment

2. Stored Material (include supplier invoice)
3. Progress Report
4. Updated Schedule
5. Affidavit of Payment of Claims
6. Certified Payrolls
7. DBE Participation Report

7. Change Order (ref. Paragraphs 00 1500-82 & 00 1500-83)
(7 copies)

Note: Initiation will be dependent upon reason for Change Order

Forms: Contract Change Order (Section 00 1450)

Progression:
Construction Inspector
Contractor
Design Engineer (Consultant)
Contract Analyst (review)
City Project Engineer (review)
Project Manager (approval/signature)
Division Head (approval/signature)
Purchasing
City Manager (approval/signature)
City Council (approval)
Contract Analyst (distribution)
Contractor

Distribution:
City Project Engineer-1
Project Manager-1
Contractor-2
Construction Inspector-1
Clerk of Council-1
Contract Analyst-1
Finance-1
Design Engineer (Consultant)-1

8. Notice of Delay (ref. para. 00 1500-79)
(1 copy)

Forms: Notice of Delay (Section 00 1440)

Progression:
Contractor (submit)
Construction Inspector

Distribution:
City Project Engineer-1
Project Manager-1

Construction Inspector-1
Design Engineer (Consultant)-1
Contractor-1

9. Request for Facility Interruption (ref. Paragraphs 00 1500-57 & 00 1500-59)
(1 copy)

Forms: Request for Facility Interruption (Section 00 1445)

Progression: Contractor (submit)
Construction Inspector

Distribution: City Project Engineer-1
Project Manager-1
Contractor-1
Construction Inspector-1
Design Engineer (Consultant)-1

10. Final Inspection (ref. Paragraph 00 1500-25)
(1 copy)

Forms: Request for Final Inspection (Section 00 1465)

Progression: Contractor (request inspection)
Construction Inspector

Action:
1. Notification
   a. Project Manager
   b. City Project Engineer
   c. Design Engineer (City/Consultant)
   d. Contractor
2. Final Inspection
3. Review As-builts and Recordable Plats

11. Final Payment (ref. Paragraphs 00 1500-74 & 00 1500-85)
(3 copies)

Forms: Request for Periodic Payment Forms
Affidavit of Payment of Claims (Section 00 1435)
Statement of Surety (Section 00 1470)
Contractor's Release (Section 00 1475)
DBE Participation Report (Section 00 1437)

Progression: Contractor (submit)
Design Engineer (Consultant)
Contract Analyst (approval)

Construction Inspector (approval)
City Project Engineer
Contract Analyst (payment procedure)
Project Manager
Contract Analyst
Finance (payment)
Contractor

Distribution: Construction Inspector-1
Contract Analyst-1
Finance-1

Contents (unit price & lump sum contracts):

1. Request for Periodic Payment
2. Stored Material (include supplier invoice)
3. Progress Report
4. Updated Schedule
5. Affidavit of Payment of Claims
6. Certified Payrolls
7. Statement of Surety
8. Contractor's Release
9. DBE Participation Report

12. Final Acceptance (ref. Paragraph 00 1500-25)
(1 copy)

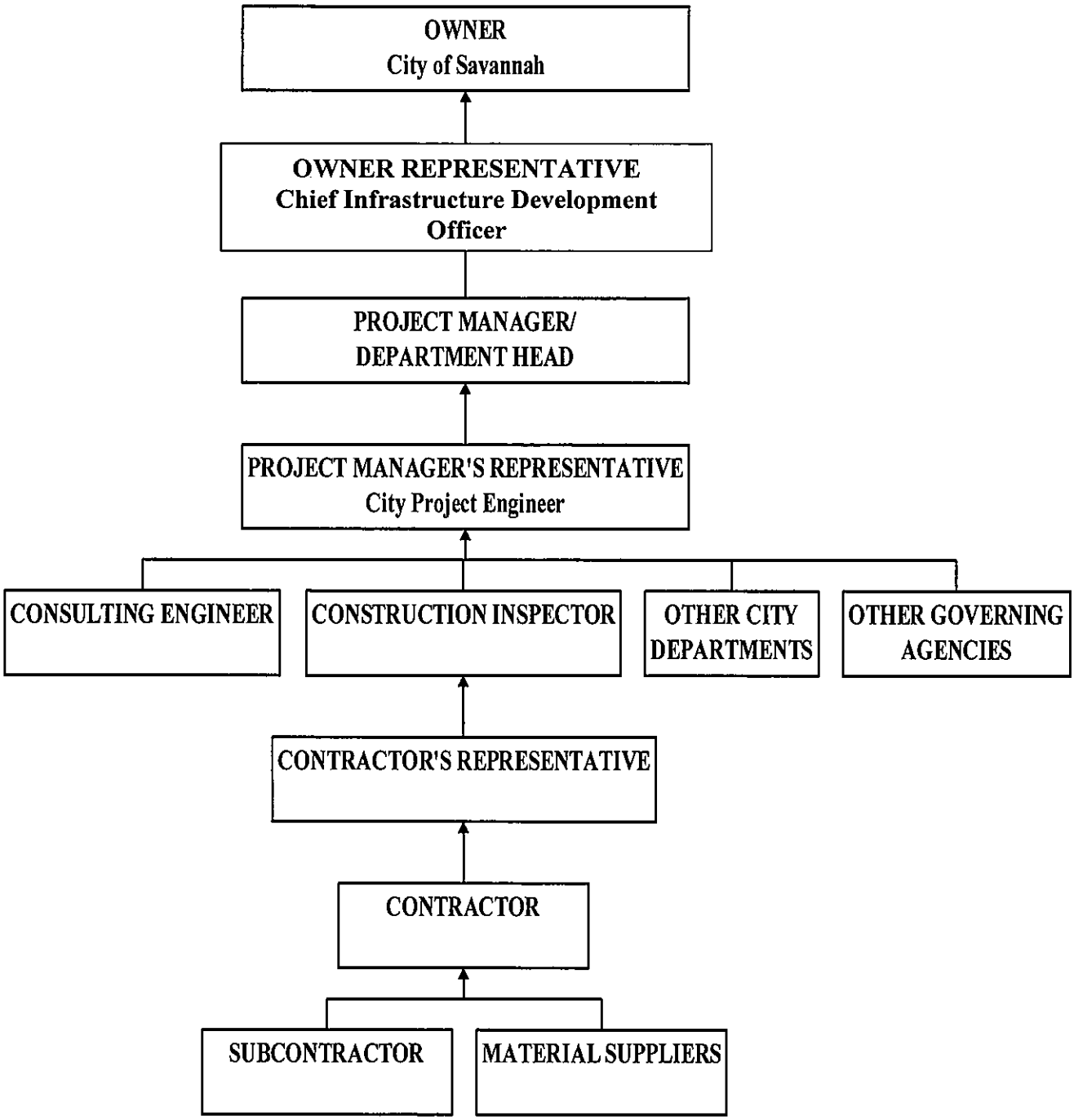
Forms: Notice of Final Acceptance (Section 00 1480)

Progression: Construction Inspector (issue)
Contractor

Distribution: City Project Engineer-1
Design Engineer-1
Project Manager-1
Contractor-1
Construction Inspector-1
Contract Analyst-1

SECTION 00 1405

ORGANIZATIONAL FLOW CHART



Section 00 1410
SUBMITTAL TRANSMITTAL

CONSTRUCTION INSPECTOR: _____
SUBMITTAL No.: _____
PROJECT: Travis Field Water Reclamation Facility
PROJECT NO.: SW-524-10
CONTRACTOR: _____ **DATE:** _____

The following material is transmitted for submittal review:

NO.	DATE	COPIES	DESCRIPTION/EQUIPMENT NO.

We have verified that the material transmitted herein is in compliance with the specifications:
_____ **with no exceptions**
_____ **except for the following deviations:**

NO.	DEVIATION

_____
(Contractor's Representative's Signature)

SUBMITTAL REVIEW

REVIEW IS FOR GENERAL COMPLIANCE WITH CONTRACT DOCUMENTS. NO RESPONSIBILITY IS ASSUMED FOR CORRECTNESS OF DIMENSIONS OR DETAILS

Remarks:

_____
_____
_____
_____
_____

NO EXCEPTIONS TAKEN _____
MAKE CORRECTIONS NOTED _____
AMEND AND RESUBMIT _____
REJECTED - SEE REMARKS _____

Date: _____ **By:** _____
Design Engineer

Section 00 1415
REQUEST FOR SUBSTITUTION

CONSTRUCTION INSPECTOR:_____
SUBMITTAL No.:_____
PROJECT: Travis Field Water Reclamation Facility
PROJECT NO.: SW-524-10
CONTRACTOR:_____ **DATE:**_____

The following is requested for substitution:

NO.	MATERIAL/EQUIPMENT SPECIFIED	MATERIAL/EQUIPMENT SUBSTITUTION

We have verified that the material transmitted herein is in compliance with the specifications:
_____ **with no exceptions**
_____ **except for the following deviations:**

NO.	DEVIATION

_____
(Contractor's Representative's Signature)

SUBMITTAL REVIEW

REVIEW IS FOR GENERAL COMPLIANCE WITH CONTRACT DOCUMENTS. NO RESPONSIBILITY IS ASSUMED FOR CORRECTNESS OF DIMENSIONS OR DETAILS

_____ **NO EXCEPTIONS TAKEN**

_____ **MAKE CORRECTIONS NOTED**

_____ **AMEND AND RESUBMIT**

_____ **REJECTED – SEE REMARKS**

Remarks_____

Date:_____ **By:**_____
Design Engineer

Section 00 1420

REQUEST FOR PERIODIC PAYMENT

UNIT PRICE CONTRACT

PROJECT NAME: Travis Field Water Reclamation Facility

PROJECT NO.: SW-524-10

CONTRACTOR: _____

PAYMENT REQUEST NO: _____

PERIOD| FROM _____; TO _____

APPLICATION DATE: _____

PAGE ____ OF _____

CONTRACT						PREVIOUS		CURRENT		TO DATE	
ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL AMOUNT	QUANTITY	AMOUNT	QUANTITY	AMOUNT	QUANTITY	AMOUNT

Section 00 1420

REQUEST FOR PERIODIC PAYMENT

UNIT PRICE CONTRACT

PROJECT NAME: Travis Field Water Reclamation Facility

PROJECT NO.: SW-524-10

CONTRACTOR: _____

PAYMENT REQUEST NO.: _____

PERIOD FROM: _____ TO: _____

APPLICATION DATE: _____

PAGE _____ OF _____

CONTRACT						PREVIOUS		CURRENT		TO DATE	
ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL AMOUNT	QUANTITY	AMOUNT	QUANTITY	AMOUNT	QUANTITY	AMOUNT

Original Contract Completion Date _____

Adjusted Contract Completion Date _____

Original Contract Amount _____

Net Change Orders _____

Adjusted Contract Amount _____

Value of Original Work Performed to Date _____

Value of Change Order Work Performed to Date _____

Total Value of All Work Performed to Date _____

Value of Materials Stored (This Request) _____

Less _____% Retained By Owner _____

Net Amount Earned on Contract to Date _____

Less Amount of Previous Payments Approved _____

BALANCE DUE THIS REQUEST _____

CONTRACTOR: _____

CERTIFICATION OF CONTRACTOR

I certify to the best of my knowledge and belief that all items and amounts on the face of this Periodical Estimate and Application for Payment are correct; that all work has been performed and/or material supplied in full accordance with the terms and conditions of the Contract Documents referred to on the fact of this form, including all duly authorized deviations, substitutions, alterations, additions, and/or deletions; that the forgoing is a true and correct statement of the Contract account up to and including the last day of the period covered by this periodical estimate and application for payment that no part of the "BALANCE DUE THIS PAYMENT" has been received; that all previous Progress Payments received on this Contract have been applied by the undersigned to discharge in full all obligations of the undersigned incurred in connection with the Work covered by prior applications for payment under this Contract; and that all materials and equipment incorporated in said payment or otherwise listed in or covered by this application for payment are free and clear of all liens, claims, security interest and encumbrance.

DATE: _____

BY: _____

TITLE:_____

Section 00 1425
STORED MATERIALS

Attachment to Pay Request No._____

CONSTRUCTION INSPECTOR:_____
PAGE_____ **OF** _____
PROJECT: Travis Field Water Reclamation Facility
PROJECT NO.: SW-524-10
DATE:_____

Material Description	This Pay Period				To Date	
	No. Units Stored	Cost Per Unit	Date Stored	Total Cost	No. Units Stored	Total Cost

00 1425-1

Section 00 1430

PROGRESS REPORT

CONSTRUCTION INSPECTOR: _____
PROJECT: Travis Field Water Reclamation Facility
PROJECT NO.: SW-524-10
CONTRACTOR: _____
DATE: _____

The following describes all progress of the work since the date of the last progress report.

_____

_____

_____

_____

_____

_____

During this reporting period the following delays occurred.

_____

_____

_____

_____

_____

_____

The following delays are expected during the next reporting period.

_____

_____

_____

_____

_____

_____

_____

Contractor's Representative

Section 00 1435

AFFIDAVIT OF PAYMENT OF CLAIMS

PROJECT NAME: Travis Field Water Reclamation Facility

_____(CONTRACTOR)

THIS DAY _____appeared before me, _____, a Notary Public, in and for the City of Savannah, and being by me first duly sworn states that all subcontractors and suppliers of labor and materials have been paid all sums due them to date for work performed or material furnished in the performance of the contract between:

THE MAYOR AND ALDERMEN OF THE CITY OF SAVANNAH (OWNER) and _____(CONTRACTOR), dated _____, 20__, for the construction of Travis Field Water Reclamation Facility.

City Project No. SW-524-10

CONTRACTOR

BY:_____

TITLE:_____

DATE:_____

SEAL OF CONTRACTOR
(If a Corporation)

Subscribed and sworn to before me on this
___ day of _____,20__.
My commission expires on the _____ day of
_____, 20___.

NOTARY PUBLIC

(NOTARY SEAL)

SECTION 00 1437
DBE PARTICIPATION REPORT

IMPORTANT NOTICES

- The DBE Participation Report (Form 00 1437) must be submitted to the City of Savannah **Contract Analyst and the Office of Business Opportunity** with each pay request. Failure to submit this form can result in no credit toward contracted DBE requirements and a possible delay in monthly progress payments.
- The Prime Contractor/Consultant **may not change DBE firms without prior written approval of the City.** Contractors/Consultants may use the Add/Change of DBE Subcontractor Form (Section 00 1438) to request changes to the Proposed Schedule of DBE Participation (Section 00 1310). Any unauthorized substitution of DBE subcontractors can result in withholding of payments for up to 30 days until compliance is reestablished.
- **Documentation providing proof of payments to DBEs for work on this project shall be kept on file and available for inspection by City staff.**

PROJECT NAME & NUMBER: Travis Field Water Reclamation Facility (SW-524-10)_____ DATE _____ REPORT NO. _____

PRIME CONTRACTOR/CONSULTANT _____ CONTRACT AMOUNT ($) _____

DBE GOAL **20%** ☐ **This is the final project report. End Date:** _____

DBE INFORMATION					DBE PAYMENTS			
APPROVED DBEs	DESCRIPTION OF WORK or SUPPLIES	DBE CONTACT PERSON	DBE CONTACT PHONE #	DBE CONTACT EMAIL	ORIGINAL SUBCONTRACT AMOUNT	PAYMENT DATE(S)	TOTAL PAID THIS PERIOD	TOTAL PAID TO-DATE

Total DBE Paid To Date: $_____ _____%

CONTRACTOR: I hereby certify this information is true and correct; and supporting documentation is on file and available for inspection by the City at any time.

SIGNED _____ **TITLE** _____ **DATE** _____

CITY OF SAVANNAH

This report has been reviewed for DBE contract compliance.

SBO Compliance Coordinator _____ **DATE**_____

SECTION 00 1437
DBE PARTICIPATION REPORT

INSTRUCTIONS TO CONTRACTOR/CONSULTANT

To receive credit toward contracted DBE goals, the Prime Contractor/Consultant must complete and submit this form with each Request for Periodic Payment, beginning with the first payment request. An additional copy of this section must be submitted **to the SBO Compliance Coordinator**. The Office of Business Opportunity may be contacted by phone at (912) 652-3582 or by fax at (912) 651-3175. **Failure to submit this form may result in no credit toward the contract DBE requirements and a delay in monthly progress payment.**

1. Project Name:	The official name of the project as stated on the contract
2. Date:	Date Report is being submitted
3. Report Number:	Reports must be consecutively numbered.
4. Contract Amount:	Total amount of the contract to be paid to the Prime Contractor/Consultant by the City of Savannah for completion of the project.
5 DBE Goals:	Enter the contracted DBE Goals per the signed agreement.
6. Final Project Report	Place an "X" or checkmark in this box when the project has been completed and the report submitted is the final payment report. Enter the date of project completion.
7. DBE Information:	ONLY DBEs that have been verified and approved by the City of Savannah DBE Office, from the Prime Contractor's/Consultant's "Proposed Schedule of DBE Participation" may be included on the payment report. NO SUBSTITUTIONS OR CHANGES IN GOALS MAY BE MADE without prior written approval by the City.
8. DBE Payments:	Enter the actual amount of the subcontract agreement for each approved DBE, the date of any payments occurring within the report period, the amount of the payments to each DBE during this period and the total each DBE has been paid-to-date.
9. Earnings-to-date:	Enter the total amount paid to date to all DBE subcontractors.
10. Contractor Certification:	The contractor or his authorized representative must sign this form prior to submittal. Signature indicates that all information is true and correct and documented proof of all information is on file and available for City of Savannah review at any time.

GENERAL INFORMATION

The prime contractor/consultant may not change DBE firms without prior written approval of the City of Savannah Office of Business Opportunity. Approval cannot be obtained from the City's Project Manager, Contract Analyst or other City of Savannah employees. Contractors/Consultants must use the Add/Change of DBE Subcontractor Form (Section 00 1438) to request changes to the Proposed Schedule of DBE Participation (Section 00 1310). **Any proposed changes must meet established DBE goals and conform to contract regulations and DBE Program Requirements.**

If the prime contractor/consultant in its bid/proposal included any second or lower tier subcontractor/sub-consultant/supplier towards meeting the goal, it is the sole responsibility of the prime contractor/consultant to ensure all DBE firms have been reviewed and approved by the City of Savannah and to document all subcontracting/sub-consulting and/or supplier participation dollars counted towards the goal, irrespective of tier level. Upon completion of the work, a final "DBE Participation Report" will be required and submitted with the final pay request.

As per the City's contract, the City's SBO policy, and signed participation reports: the prime contractor/consultant certifies all DBE payment information to be true and correct, to have all supporting documentation on file and to make copies of this documentation available to the City of Savannah. **Prime contractors/consultants will periodically be required to provide copies of payment documentation** for DBEs being counted toward the DBE goal (including the prime contractor/consultant, if it is a DBE and being counted toward the goal). Failure to comply with the City's request to provide the required documentation may cause the City to withhold payments due the prime contractor/consultant until compliance is attained. Payment documentation includes but is not limited to:

- signed sub-contracts with DBEs being utilized in meeting the project's DBE goals
- DBE invoices for payment related to the project
- proof of payment of DBE invoices related to the project

City SBO Office Use
Date Received: _____
Time Received: _____

Section 00 1438
ADD/CHANGE OF DBE SUBCONTRACTOR FORM

IMPORTANT NOTICE TO CONTRACTORS: The prime contractor **may not** change DBE firms without **prior** written approval of the City's Office of Business Opportunity. Changes **cannot** be approved by other City of Savannah personnel. All requests for DBE substitutions must be made in writing, must include an explanation for the requested change, and must have supporting documentation. Additionally, all requested changes must continue to meet DBE goals, conform to contract regulations, utilize certified DBEs and meet DBE program requirements. **Any unauthorized substitution of DBE subcontractors may result in withholding of payment to the prime contractor for up to 30 days until compliance is reestablished.**

Project Name: Travis Field Water Reclamation Facility Project Number: (SW-524-10)

Prime Contractor/Consultant Name: _____

Address: _____ Telephone: _____

Prime Contractor/Consultant - Designee's Signature: _____ Date: _____

Position/Title: _____

APPROVED SCHEDULE OF DBE PARTICIPATION (Section 00 13 10) *(List certified DBEs that were approved per contract.)*		**Proposed Change?**	**PROPOSED ADDITIONS OR CHANGES TO DBE PARTICIPATION** *(Complete only for rows where "Proposed Change" is marked "Yes".)*		
DBE Subcontractor Name	**Estimated Subcontract Value**		**DBE Subcontractor Name**	**Estimated Subcontract Value**	**Certified DBE? Y/N**
		☐ Yes ☐ No			
		☐ Yes ☐ No			
		☐ Yes ☐ No			
		☐ Yes ☐ No			
		☐ Yes ☐ No			
		☐ Yes ☐ No			
		☐ Yes ☐ No			
		☐ Yes ☐ No			

Provide a detailed explanation to justify any proposed changes noted in the table above. The explanation must provide a legitimate business-related reason for changing the approved DBE plan. (Attach additional sheets if needed.)

_____

_____

_____

_____

Project Manager

_____Concerns noted regarding proposed change _____No concerns noted regarding proposed change

Project Manager Signature: _____ Date: _____

Office of Business Opportunity

_____Change Approved _____Change Denied

If denied, enter explanation: _____

Signature of Office of Business Opportunity Representative _____ Date: _____

Copy: Prime Contractor, Project Manager, Contract Analyst and Office of Business Opportunity (project file)

Section 00 1440

NOTICE OF DELAY

CONSTRUCTION INSPECTOR:_____
PROJECT: Travis Field Water Reclamation Facility
PROJECT NO.: SW-524-10
CONTRACTOR:_____
DATE:_____

Notice is hereby given that a delay has or will occur and is described as follows:

_____
_____
_____
_____
_____
_____
_____

By:_____ Date:_____
Contractor's Representative

Received:_____ Date:_____
Construction Inspector

Received:_____ Date:_____
City Project Engineer

Response to Notice:

_____
_____
_____
_____
_____

_____ Date:_____
Construction Inspector

_____ Date:_____
Project Manager

Section 00 1445

REQUEST FOR FACILITY INTERRUPTION

CONSTRUCTION INSPECTOR:_____
PROJECT: Travis Field Water Reclamation Facility
PROJECT NO.: SW-524-10
CONTRACTOR:_____
DATE:_____

Request is hereby made for temporary interruption of the following facilities:

_____

_____

_____

_____

_____

_____

_____

Requested By:_____
(Contractor's Representative)

Received:_____ Date:_____
Construction Inspector

Received:_____ Date:_____
City Project Engineer

Response to Request

_____

_____

_____

_____

_____

_____

_____ Date:_____
Construction Inspector

_____ Date:_____
Project Manager

SECTION 00 1450
CONTRACT CHANGE ORDER

PROJECT: Travis Field Water Reclamation Facility CHANGE ORDER NO.:_____
PROJECT NO.: SW-524-10 CONTRACT DATE:_____
CONTRACTOR:_____

The following changes are hereby made to the Contract Documents:

Item No.	Description	Decrease In Contract Price	Increase In Contract Price

TOTALS $_____ $_____
NET CHANGE IN CONTRACT PRICE $_____ $_____
(Decrease) (Increase)

JUSTIFICATION:_____

CONTRACT PRICE PRIOR TO THIS CHANGE ORDER $_____
CONTRACT PRICE BY THIS CHANGE ORDER WILL BE DE/INCREASED BY $_____
NEW CONTRACT PRICE, INCLUDING THIS CHANGE ORDER, WILL BE $_____
COMPLETION DATE PRIOR TO THIS CHANGE ORDER: _____
NEW CONTRACT WILL BE INCREASED BY _____ CALENDAR DAYS.
NEW DATE FOR COMPLETION OF ALL WORK WILL BE: _____

To be effective this Change Order must be approved by the applicable City department. This document will become a supplement to the Contract and all provisions will apply hereto. This Change Order represents final release for any and all amounts due or to become due contracted for changes referred to herein. Contractor further releases all other claims, if any, except those claims previously submitted in writing in strict accordance with the terms of the contract, for additional compensation under this contract, including without limitation any rights Contractor may have for additional compensation arising out of delays or disruptions of the Contractor's schedule as may have arisen prior to the date of the modification.

REQUESTED BY:				
(CONTRACTOR)	NAME	SIGNATURE	TITLE	DATE
RECOMMENDED BY:				
(CONSULTANT)	NAME	SIGNATURE	TITLE	DATE
ACCEPTED BY:	Charles Tessmer, PE		Water & Sewer Sr. Civil Engineer	
(PROJECT ENGINEER)	NAME	SIGNATURE	TITLE	DATE
ACCEPTED BY:	Abe Ghazi, PE		Water & Sewer Planning & Engineering Director	
(PROJECT MANAGER)	NAME	SIGNATURE	TITLE	DATE
ACCEPTED BY:	Lester Hendrix		Water Reclamation Director	
(DEPARTMENT HEAD)	NAME	SIGNATURE	TITLE	DATE
ACCEPTED BY:	John L. Sawyer, PE		Public Works and Water Resources Director	
(DEPARTMENT HEAD)	NAME	SIGNATURE	TITLE	DATE
ACCEPTED BY:	Heath Lloyd, PE		Chief Infrastructure and Development Officer	
(ASST. CITY MANAGER)	NAME	SIGNATURE	TITLE	DATE
APPROVED BY:	Roberto Hernandez		City Manager	
(CITY MANAGER)	NAME	SIGNATURE	TITLE	DATE

Section 00 1465
REQUEST FOR FINAL INSPECTION

CONSTRUCTION INSPECTOR: _____
PROJECT: Travis Field Water Reclamation Facility
PROJECT NO.: SW-524-10
CONTRACTOR: _____
DATE: _____

Notice is hereby given that all work has been completed in conformance with the requirements of the contract documents. All "punch list" items have been completed. Record drawings are submitted herewith. Request is hereby made for a final inspection of the work.

Requested date of Inspection: _____

Requested By: _____
Contractor's Representative

Response to Request: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____
Construction Inspector

_____
City Project Engineer

Section 00 1470

STATEMENT OF SURETY COMPANY

IN ACCORDANCE with the provisions of the CONTRACT, dated _____,20_____ BETWEEN THE MAYOR AND ALDERMEN OF THE CITY OF SAVANNAH, OWNER, AND _____ (CONTRACTOR), THE _____(SURETY).

SURETY on the Material and Labor Payment BOND of:

_____(CONTRACTOR).

After careful examination of the books and records of said CONTRACTOR, or after receipt of an affidavit from CONTRACTOR, which examination of affidavit satisfies SURETY that all claims for labor and materials have been satisfactorily settled, hereby approve of the final payment of the said _____(CONTRACTOR) and set forth in the said SURETY COMPANY'S BOND.

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

ATTEST:

(SEAL) BY:_____
PRESIDENT

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

(SEAL) BY:_____
BONDING COMPANY AGENT

NOTE: The statement of surety must come from the bonding company.

Section 00 1475

CONTRACTOR'S RELEASE

KNOW ALL PERSONS BY THESE PRESENTS THAT:

_____(CONTRACTOR)

of _____ County/City and State of _____does hereby acknowledge that upon receipt of final payment, amounting to $_____, from the MAYOR AND ALDERMEN OF THE CITY OF SAVANNAH, which then represents full satisfaction and payment of all sums of money owing, payable and belonging to _____(CONTRACTOR) (for myself, my heirs, executors and administrators; for itself, its successors and assigns) who hereby releases the Mayor and Aldermen of the City of Savannah from all claims and demands arising from or in connection with the said CONTRACT, dated _____, 20_____, and of and from all, and all manner of action and actions, cause and causes of action and actions, suits, debts, dues, duties, sum and sums of money agreements, promises, variances, damages, judgments, extent, executions, claims and demand, whatsoever in law or equity, or otherwise which against the said MAYOR AND ALDERMEN OF THE CITY OF SAVANNAH, it's successors and assigns ever had, now have, or which (I, my heirs, executors, or administrators; it, its successors and assigns) hereafter can, shall or may have, for upon or by reason of any matter, cause or thing whatsoever, from the award of the contract to the date of these presents.

IN WITNESS WHEREOF _____(CONTRACTOR) has caused these presents to be dully executed this _____ day of _____, 20____.

Signed, Sealed and Delivered in the Presence of:

_____ _____(SEAL)
INDIVIDUAL

_____ _____(SEAL)
PARTNERSHIP CONTRACTOR

ATTEST:

_____ BY:_____(SEAL)
PARTNER

_____(SEAL)
CORPORATION

ATTEST:

_____ BY:_____
SECRETARY

(AFFIX CORPORATE SEAL)

Section 00 1480
NOTICE OF FINAL ACCEPTANCE

CONTRACTOR:_____
PROJECT: Travis Field Water Reclamation Facility
PROJECT NO.: SW-524-10
CONSTRUCTION INSPECTOR:_____
DATE:_____

Gentlemen:

Based upon our final inspection of the work, we have found the work performed to be complete and in conformance with the contract documents. Therefore, the City of Savannah hereby accepts the work performed and responsibility for regular maintenance of same. This acceptance does not in any way relieve you, as the contractor, of any special maintenance requirements or guarantees as stipulated in the contract documents. You are also hereby informed that the 12 month warranty period as stipulated in the contract shall expire at 11:59 p.m.,_____.

It is the responsibility of the Contractor to notify the Owner prior to this end of the 12-month warranty period. This Warranty period shall remain in effect until the Owner is notified and a Final Inspection has occurred.

_____
Project Manager

cc: City Project Engineer
Contract Analyst
Design Engineer (Consultant)

SECTION 00 1490

CONTRACTOR'S (and SUBCONTRACTORS') ACKNOWLEDGMENT FOR RESPONSIBILITY FOR SHOP DRAWING APPROVAL

(To be submitted by the Contractor/Subcontractor with all shop drawings).

The undersigned Contractor, _____, and his Subcontractor(s), _____, hereby certify that he has reviewed all notes, drawings modifications materials and specifications prepared by the Consulting Engineers pertaining to the "Shop Drawings" attached hereto. It is acknowledged that all changes and variances from the Contract Documents that are contained in said "Shop Drawings" have been flagged or otherwise marked in and ***circled in red.*** It is also acknowledged that any changes must be approved by the Project Manager and the Consulting Engineer. It is further acknowledged that **any work done that differs from the work as described in the Contract Documents that has not been approved by the Owner in a manner described above shall be the exclusive responsibility of the Contractor and/or his Subcontractors;** this responsibility includes liability for any increases in cost above the Contract amount and any cost associated with the repair or restoration of the Work as shown in the Approved Contract Documents, including the cost of the delay associated therewith.

_____ [L.S.]
By:
_____
Date:
_____ , Contractor

_____ [L.S.]
By:
_____
Date:
_____ , Contractor

GENERAL CONDITIONS OF THE CONTRACT

SECTION 00 1500

Approved:

GENERAL CONDITIONS OF THE CONTRACT
Section 00 1500
INDEX

GENERAL CONDITIONS
SECTION 00 1500

01 - Definitions

Where used in the project manual, the following words and terms shall have the meanings indicated. The meanings shall be applicable to the singular, plural, masculine and feminine of the words and terms.

Acceptance. Formal action of the Owner in determining that the Contractor's work has been completed in accordance with the contract and in notifying the Contractor in writing of the acceptability of the work.

Act of God. A cataclysmic phenomenon of nature, such as a hurricane, earthquake or abnormal flood. Rain, wind, high water, or other natural phenomenon which might reasonably have been anticipated from historical records of the general locality of the work shall not be construed as acts of God.

Addenda. Supplemental written specifications or drawings issued prior to execution of the contract which modify or interpret the project manual by addition, deletion, clarification, or corrections.

Bid. Offer of a bidder submitted on the prescribed form setting forth the price or prices of the work to be performed.

Bidder. Individual, partnership, corporation, or a combination thereof, including joint ventures, offering a bid to perform the work.

City. Owner.

Construction Inspector. The person designated, in writing, by the Consultant / Engineer to act as its representative at the construction site and to perform construction inspection services and administrative functions relating to this contract. Initial contact by the Contractor with the Engineer shall be through the Construction Inspector.

Contract. The writings and drawings embodying the legally binding obligations between the Owner and the Contractor for completion of the work.

Contract Documents. Project Manual.

Contract Drawings. The drawings included in the contract documents, plus those prepared by the Owner and the Contractor pursuant to the terms of the contract. They include:

1. Drawings in Contract Documents for bidding.
2. Modifying drawings issued by addenda.
3. Drawings submitted by the Contractor during the progress of the work and accepted by the Owner either as attachments to change orders or as non-modifying supplements to drawings in Item 1 above and drawings issued by addenda.

4. Drawings submitted by the Owner to the Contractor during the progress of the work either as attachments to the change orders or as explanatory supplements to drawings in Item 1 above and drawings issued by addenda.

Contract Price. Amount payable to the Contractor under the terms and conditions of the contract. Based on the price given on the bidding schedule, with adjustments made in accordance with the contract. The base amount given in the bidding schedule shall be either a lump sum bid or the summation of the unit price bids multiplied by the estimated quantities set forth in the bid form.

Contract Time. Number of calendar days stated in the contract for the completion of the work or portions thereof.

Contractor. The individual, partnership, corporation, or combination thereof, including joint venturers who enter into the contract with the Owner for the performance of the work. The term covers subcontractors, equipment and material suppliers, and their employees.

Contractor's Plant and Equipment. Equipment, material, supplies, and all other items, except labor, brought onto the site by the Contractor to carry out the work, but not to be incorporated in the work.

Day. Calendar day.

Direct. Action of the Owner by which the Contractor is ordered to perform or refrain from performing work under the contract.

Directive. Written documentation of the actions of the Owner in directing the Contractor.

Engineer. The City Engineer of the City of Savannah or the City Project Engineer.

Equipment. Mechanical, electrical, instrumentation or other device with one or more moving parts, or devices requiring an electrical, pneumatic, electronic, or hydraulic connection.

Furnish. To deliver to the job site or other specified location any item, equipment or material.

Herein. Refers to information presented in the project manual.

Holidays. Legal holidays designated by the City or specifically identified in supplementary conditions.

Install. Placing, erecting, or constructing complete in place any item, equipment, or material.

May. Refers to permissive actions.

Owner. The City of Savannah.

Owner's Representative. The City Engineer, City Bureau Chief, or their

representative.

Paragraph. For reference or citation purposes, paragraph shall refer to the paragraph, or paragraphs, called out by section number and alphanumeric designator. For example, this definition is found in Section 00 1500, Paragraph 01; permits and regulations are discussed in Section 00 1500, Paragraph 03).

Person. The term, person, includes firms, companies, corporations, partnerships, and joint ventures.

Project. The undertaking to be performed under the provisions of the contract.

Project Manual. Those contact documents prepared for bidding and as amended by addenda.

Provide. Furnish and install, complete in place.

Punch List. List of incomplete items of work and of items of work which are not in conformance with the contract. The list will be prepared by the Engineer when the Contractor (1) notifies the Engineer in writing that the work has been completed in accordance with the contract and (2) requests in writing that the Owner accept the work.

Shall. Refers to actions by either the Contractor or the Owner and means the Contractor or Owner has entered into a covenant with the other party to do or perform the action.

Shown. Refers to information presented on the drawings, with or without reference to the drawings.

Specifications. That part of the contract documents consisting of written descriptions of the technical features of materials, equipment, construction system, standards, and workmanship.

Specify. Refers to information described, shown, noted or presented in any manner in any part of the contract.

Submittals. The information which is specified for submission to the Owner in accordance with the project manual.

Substantial Completion. Sufficient completion of the project or the portion thereof to permit utilization of the project, or portion thereof for its intended purpose. Substantial completion requires not only that the work be sufficiently completed to permit utilization, but that the Owner can effectively utilize the substantially completed work. Determination of substantial completion is solely at the discretion of the Owner. Substantial completion does not mean complete in accordance with the contract nor shall substantial completion of all or any part of the project entitle the Contractor to acceptance under the contract.

Substantial Completion Date. Date shown on the certificate of Substantial Completion.

Will. Refers to actions entered into by the Contractor or the Owner as a covenant with the other party to do or to perform the action.

Work. The labor, materials, equipment, supplies, services, and other items necessary for the execution, completion and fulfillment of the contract.

02 - Royalties and Patents

The Contractor shall pay all royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and shall hold the Owner harmless from loss on account thereof except that the Owner shall be responsible for all such loss when a particular manufacturer, product, or process is specified by the Owner.

03 - Permits and Regulations

Permits, licenses, and easements of a temporary nature necessary for the prosecution of the work shall be secured and paid for by the Contractor including, but not limited to, business licenses, street maintenance decals, construction easements, burning permits, etc. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the Owner, unless otherwise specified. Building permit fees as issued by the City of Savannah Department of Inspections shall be paid for by the City.

The Contractor shall comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified.

04 - Verbal Agreements

No verbal agreement or conversation with any officer, agent or employee of the Owner either before, during or after execution of this Contract, shall affect or modify any of the terms of obligations contained in any of the documents comprising said Contract.

05 - Lands for Work

The Owner shall provide, as indicated on the drawings and not later than the date when needed by the Contractor, the Lands upon which the work under this Contract is to be done, rights-of-way for access to same, and such other lands which are designated on the drawing for the use of the Contractor. Any delay in the furnishing of these Lands by the Owner shall be deemed proper cause for an equitable adjustment in both contract price and time of completion.

The Contractor shall provide at his own expense and without liability to the Owner any additional land and access thereto that may be required for temporary construction facilities, or for storage of materials.

06 - Guarantee Against Defective Work

The Contractor shall guarantee the work required under this Contract for a period of twelve months from the date of Final Acceptance (may be Substantial Completion if defined in Section 00 1600). The Contractor shall remedy, at his own expense, and without additional cost to the Owner, all defects arising from either workmanship or materials, as determined by the Engineer. The guarantee shall not cover any accidental or

deliberate damage to the work due to normal wear and tear during the guarantee period.

07 - Bonds

The Contractor shall furnish payment and performance bonds with good and sufficient surety or sureties acceptable to the Owner for the protection of persons furnishing materials or labor in connection with the performance of the work. The penal sum of such payment and performance bond will be 100% of the contract price. The bonds required hereunder will be dated as of the same date as the contract and will be furnished to the Owner at the time the contract is executed. These bonds must be in the form provided herein. **NO OTHER FORM WILL BE ACCEPTED.** These bonds shall be issued from a company licensed to do business in Georgia and shall be signed or counter signed by a Georgia agent, and shall have a proper Power of Attorney evidencing the authority of the individual signing the bond. Included with the Bonds shall be a signed **Affidavit** on the form provided herewith.

The Mayor and Aldermen of the City of Savannah may waive performance and payment bonds on contracts less than $100,000 in value. When this is done, the Special Payment Provision given in Section 00 1500, Paragraph 74 shall apply.

08 – Contractor's Insurance

(a) Liability. The Contractor shall maintain such insurance as will protect him from claims under workers compensation acts and from any other claims for damages to property, and for personal injury, including death, which may arise from operations under this contract, whether such operations be by himself or by any subcontractor or anyone directly or indirectly employed by either of them. Certificates of such insurance shall be filed with the Owner, and shall be subject to his approval for adequacy of protection. The Contractor shall be responsible for providing adequate limits of insurance when working within property owned by railroads, as established by such railroad company.

(b) Certificate of Insurance and Endorsements. For each insurance policy required under this contract, the Contractor shall provide a Certificate of Insurance naming the Mayor and Aldermen of the City of Savannah as CERTIFICATE HOLDER and the following endorsements for each policy:

i. A waiver of subrogation in favor of the Mayor and Alderman of the City of Savannah, its agents and/or employees shall also be provided and attached to the Certificate.

ii. A thirty (30) day cancellation in favor of the Mayor and Alderman of the City of Savannah, its agents and/or employees must be endorsed to the policy and attached to the Certificate.

(c) Indemnity. The Contractor shall indemnify and hold harmless, the Owner from and against all losses and all claims, demands, payment, suits, actions, recoveries, and judgments of every nature and description brought or recovered against the Contractor by reason of any act or omission of the said Contractor, his agents or employees, in execution

of the work or in the guarding of it.

***The limits of insurance are as follows:**

►**Comprehensive Commercial General Liability** - policy covering bodily injury and property damage including premises, operations, products, and completed operations

Limits (or Higher):

General Aggregate:	$2,000,000
Products Completed Operations Aggregate:	$2,000,000
Each Occurrence Limit:	$1,000,000
Personal Injury Limit:	$1,000,000
Damage to Premises Rented to You:	$ 50,000
Medical Expenses:	$ 5,000 Any One Person

►**Commercial Automobile Liability** - policy covering injury and property damage

Limits:

$1,000,000 per occurrence and aggregate (minimum)

►**Workers Compensation & Employers Liability (includes coverage all employees, volunteers and others under your direction and supervision)**

Limits:

Part A:	Workers Compensation:	Statutory
Part B:	Bodily Injury By Accident:	$500,000 Each Accident
	Bodily Injury By Disease:	$500,000 Policy Limit
	Bodily Injury By Disease:	$500,000 Each Employee

►**Commercial Umbrella Policy**

Limits (or Higher):

$5,000,000 Per Occurrence & Aggregate *(Minimum)*

►**Builders Risk**

Coverage Period: Coverage shall remain in force until final acceptance of the project is granted by the City, and the policy will grant permission to occupy prior to acceptance.

Policy Form: Special form including wind, flood, and earthquake.

Limit: Full value of contract including change orders. The Mayor and Aldermen of the City of Savannah are to be named Sole Loss Payee.

Sublimits:

10% of the total contract cost of the project.

- All other perils including Wind: $10,000 (deductible)
- Flood: $25,000 (deductible)

- Named Storm: 2%, maximum $100,000 (deductible)
- Earthquake: $25,000 (deductible)
- **Other:**
- No coinsurance provision
- No collapse exclusion
- No water damage limitation
- No warranties suspending coverage

►Other Items Required:

- All insurance carriers and policies are required to have an AM Best Rating of A-, IX or better

- The Mayor and Aldermen of the City of Savannah are not responsible for any of the property used in or owned by the Lessee or any participants, advertisers, promoters, etc.

- All deductibles in the coverage are the responsibility of the Contractor/Lessee.

***Contractor's Liability Insurance shall be effective for the duration of the work as described in the contract documents, including authorized change orders, plus any period of guarantee as required in Section 00 1500, Paragraph 06.**

09 - Liens

Neither the final payment nor any part of the retained percentage shall become due until the Contractor shall deliver to the Owner a complete release of all claims or liens arising out of this Contract and an affidavit that so far as he has knowledge or information the release and receipts include all the labor and materials for which a lien or claim could be filed; but the Contractor may, if any Subcontractor refuses to furnish a release or receipt in full, furnish an additional bond satisfactory to the Owner, to indemnify the Owner against any claim or lien (in cases where such payment is not already guaranteed by Surety Bond). If any claim or lien remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all monies that the latter may be compelled to pay on discharging such a lien, including all costs and a reasonable attorney's fee.

10 - Assignment

The Owner shall have the right to reject the assignment or sub-letting of any portion of the Contract by the Contractor. Assigning or sub-letting the Contract shall not relieve the Contractor or his surety from any Contract obligations.

11 - Joint Venture Contractor

In the event the Contractor is a joint venture of two or more Contractors, the grants, covenants, provisos and claims, rights, power, privileges and liabilities of the contract shall be construed and held to be several as well as joint. Any notice, order, direct request or any communication required to be or that may be given by the Engineer to the Contractor

under this contract, shall be well and sufficiently given to all persons being the Contractor if given to any one or more of such persons. Any notice, request or other communication given by any one of such persons to the Engineer under this contract shall be deemed to have been given by and shall bind all persons being the Contractor.

12 – Successors' Obligations

The grants, covenants, provisos and claims, rights, powers, privileges and liabilities obtained in the contract documents shall be read and held as made by and with, and granted to and imposed upon, the Contractor and the Owner and their respective heir, executors, administrations, successors and assigns.

13 - Business Tax Certificate

Contractors and subcontractors shall have a current business tax certificate, and shall furnish tax certificate numbers prior to entering into a contract with the Mayor and Aldermen of the City of Savannah.

14 - Obligations and Liability of the Contractor

The Contractor shall do all the work and furnish all the materials, tools, and appliances, except as herein otherwise specified, and everything necessary for properly performing and completing the work required by the Contract, in the manner and within the time specified. He shall complete the entire work to the satisfaction of the Engineer, and in accordance with the Specifications and Plans herein mentioned, at the prices herein agreed upon and fixed therefore. All the work, labor and materials to be done and furnished under this Contract shall be done and furnished strictly pursuant to, and in conformity with, the Contract Documents, and the directions of the Engineer as given from time to time during the progress of the work, under the terms of this Contract.

All loss or damage arising out of the performance or nature of the work, or any damage to the work itself to be done under this contract or from any unforeseen obstruction or difficulties which may be encountered in the prosecution of the same, or from the action of the elements or from any cause or causes whatsoever, until the same shall have been finally accepted, shall be sustained and paid for by the Contractor.

The Contractor shall coordinate his operations with those of any other Contractors who may be employed on other work of the Owner and shall avoid interference therewith and cooperate in the arrangements for storage of materials.

The Contractor shall conduct his work so as to interfere as little as possible with private business and public travel. He shall, at his own expense, wherever necessary or required, maintain fences, furnish watchmen, maintain lights, and take such other precautions as may be necessary to protect life and property.

The Contractor shall take all responsibility for the work done under this Contract, for the protection of the work, and for preventing injuries to persons, and damage to property and utilities on or about the work. He shall in no way be relieved of his responsibility by any rights of the Owner to give permission or issue orders relating to any part of the work,

or by any such permission given or orders issued, or by failure of the Owner to give such permission or issue such orders. The Contractor shall bear all losses resulting to him or to the Owner on account of the amount or character of the work, or because of the nature of the land in or on which the work is done is different from what was estimated or expected, or on account of the weather elements or other causes. The Contractor shall assume the defense of all claims arising out of injury or damage to persons, corporations, or property, whether said claims arise out of negligence or not, or whether said claims are for unavoidable damage or not, and from all claims relating to labor and materials furnished for the work and from all expenses incurred in defending or settling such claims, including reasonable attorney's fees.

The Contractor shall so conduct his operations as not to damage existing structures or work installed either by him or by other Contractors. In case of any such damage resulting from his own operations, he shall repair and make good as new the damaged portions at his own expense.

The Contractor warrants that he is familiar with the codes applicable to the work and that he has the skill, knowledge, competence, organization, and plant to execute the work promptly and efficiently in compliance with the requirements of the Contract Documents. The Contractor having the obligation to keep a competent superintendent on the work during its progress, to employ only skilled mechanics, and to enforce strict discipline and good order among his employees, the Contractor, himself is responsible for seeing that the work is installed in accordance with the Contract Documents. Failure or omission on the part of the Owner, representative of the Owner, agents of the Owner, Project Representative, clerk-of-the-works, engineers employed by the Engineer, representatives of the Engineer or the Engineer either to discover or to bring to the attention of the Contractor any deviation from, omission from, or non-compliance with the Contract Documents shall not be set up by the Contractor as a defense of failure to his part to install the work in accordance with the Contract Documents or for any other neglect to fulfill requirements of the Contract; nor shall the presence of any one, or all, or any of the foregoing at the site of the fact that any one, or all, or any of the foregoing may have examined the work or any part of it be set up as a defense by the Contractor against a claim for failure on his part to install the work in accordance with the Contract Documents or for any neglect to fulfill requirements of the Contract. No requirement of this Contract may be altered or waived except in pursuance of a written order of the Owner and in strict accordance with the provisions in the Contract for changes in the work.

15 - Responsibilities of the Contractor

A. Subcontractors, Manufacturers and Suppliers:

The Contractor shall be responsible for the adequacy, efficiency and sufficiency of subcontractors, manufacturers, suppliers and their employees.

B. Contractor's Employees:

The Contractor shall be responsible for the adequacy, efficiency and sufficiency of his employees. Workers shall have sufficient knowledge, skill and experience to perform properly the work assigned to them.

C. Payment for Labor and Materials:

The Contractor shall pay and require his subcontractors to pay any and all accounts for labor including Workers Compensation premiums, State Unemployment and Federal Social Security payments and other wage and salary deductions required by law. The Contractor also shall pay and cause his subcontractors to pay any and all accounts for services, equipment, and materials used by him and his subcontractors during the performance of work under this contract. Such accounts shall be paid as they become due and payable. If requested by the Owner, the Contractor shall furnish proof of payment of such accounts to the Owner.

D. Attention to Work:

The Contractor, acting through his representative, shall give personal attention to and shall manage the work so that it shall be executed faithfully. When his representative is not personally present at the project site, his designated alternate shall be available and shall have the authority to act on the contract.

E. Employee Safety:

The Contractor alone shall be responsible for the safety of his and his subcontractor's employees. The Contractor shall maintain the project site and perform the work in a manner which meets the Owner's responsibility under statutory and common law for the provision of a safe place to work.

F. Public Safety and Convenience:

The Contractor shall conduct his work so as to insure the least possible obstruction to traffic and inconvenience to the general public and the residents in the vicinity of the work and to insure the protection of persons and property. No road or street shall be closed to the public except with the permission of the Engineer and the proper governmental authority. Fire hydrants on or adjacent to the work shall be accessible to firefighting equipment. Temporary provisions shall be made by the Contractor to insure the use of sidewalks, private and public driveways and proper functioning of gutters, sewer inlets, drainage ditches and culverts, irrigation ditches and natural water courses.

G. Cooperation with the Construction Inspector:

The Contractor, when requested, shall assist the Construction Inspector in obtaining access to work which is to be inspected. The Contractor shall provide the Construction Inspector with information requested in connection with the inspection of the work.

16 - Compliance with Laws

The Contractor shall keep himself fully informed of all existing and future State and Federal Laws, all regulations of the various departments or agencies of the State of Georgia, and municipal ordinances and regulations in any manner affecting those engaged or employed in the work, or the materials used in the work, or in any way affecting the

conduct of the work and of all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same. If any discrepancy or inconsistency is discovered, in the Plans, Drawings, Specifications, or Contract for this work in relation to any such law, ordinance, regulations, order, or decree, he shall forthwith report the same to the Engineer in writing. He shall at all times himself observe and comply with, and cause all his agents and employees to observe and comply with, all such existing and future laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the Owner against any claim or liability arising from or based upon violation of any such law, ordinance, regulation, order, or decree, whether by himself or his employees or any subcontractor.

17 - Plans, Specifications and Design

It is agreed that the Owner will be responsible for the accuracy and sufficiency of the plans and specifications. The Owner shall furnish plans and specifications which completely represent the requirements of the work as far as practical to be performed under the Contract. All such drawings and instructions shall be consistent with the Contract Documents. In the cases of unit-price contracts, the units shown on the unit price schedule have been established for the purpose of uniform bidding and may or may not reflect the actual quantity of units required to perform the work. In the case of lump-sum contracts, plans and specifications which completely represent the work to be done shall be furnished prior to the time of entering into the Contract. The Owner may, during the life of the Contract, and in accordance with Section 00 1500 Paragraph 82, issue additional instructions, by means of drawings or otherwise, necessary to illustrate changes in the work.

18 - Drawings Furnished

Unless otherwise provided in the Contract Documents, the Owner will furnish to the Contractor, free of charge, up to 5 copies of drawings and specifications necessary for the execution of the work with delivery of the Notice to Proceed.

19 - Ownership of Drawings

All drawings, specifications and copies thereof furnished by the Owner shall not be reused on other work, and with the exception of the signed Contract, sets are to be returned to him on request, at the completion of the work. All models are the property of the Owner.

20 - Reference Standards

Reference to the Standards of any technical society, organization or association or to codes of local or state authorities, shall mean the latest standard, code, specifications, or tentative standard adopted and published at the date of taking bids, unless specifically stated otherwise.

21 - Division of Specifications and Drawings

Specifications and drawings are divided into groups for the convenience of the Owner. These divisions are not for the purpose of apportioning work or responsibility for

work among subcontractors, suppliers and manufacturers.

22 - Order of Completion

Within ten (10) days of issuance of the Notice of Award with the work the Contractor shall submit, to the Engineer, a schedule which shall show the order in which the Contractor proposes to carry on the work, with dates at which the Contractor will start the several parts of the work and estimated dates of completion of the several parts.

Monthly progress reports shall be delivered with the pay estimate to the Engineer showing the progress of the past month's construction in relation to the approved work schedule. **No payments will be made to the Contractor until the construction schedule has been submitted by the Contractor and approved by the Engineer.** If the progress report does not agree with the approved work schedule, the Contractor shall deliver in writing an explanation with the report. Upon request from the Engineer, the Contractor shall submit a revised schedule for approval.

23 - Materials, Appliances & Employees

Unless otherwise stipulated, the Contractor shall provide and pay for all materials, labor, water, tools, equipment, light, power, transportation, supervision and other facilities necessary for the execution and completion of the work. Unless otherwise specified, all materials incorporated in the permanent work shall be new. The Contractor shall furnish satisfactory evidence as to the kind and quality of materials in accordance with Section 00 1500 Paragraph 49.

The Contractor shall at all times enforce strict discipline and good order among his employees, and shall seek to avoid employing on the work any unfit person or anyone not skilled in the work assigned to him. If at any time before the commencement or during the progress of work, tools, equipment and supervision appear to the Engineer to be insufficient, inefficient or inappropriate to secure the quality of work required or the proper rate of progress, the Engineer may order the Contractor to increase their efficiency, to improve their character, to augment their number, or to substitute new tools, plant or equipment, as the case may be, and the Contractor shall conform to such order; but the failure of the Engineer to demand such increase of efficiency, number, or improvements shall not relieve the Contractor of his obligation to secure the quality of work and the rate of progress necessary to complete the work within the time required by this contract to the satisfaction of the Engineer.

24 - Survey Information

The Owner's representative will establish reference bench marks and base line identified on the drawings. From the information provided, the Contractor shall develop and make such additional surveys as are needed for construction, such as control lines, slope stakes, batter boards, stakes for pipe locations and other working points, lines, and elevations. Survey work shall be performed under the supervision of a licensed land surveyor. Contractor shall reestablish reference bench marks and survey control monuments destroyed by this operation at no cost to the Owner.

25 - Inspection of Work

A. General: If the specifications, the Engineer's instructions, laws, ordinances, or any public authority require any work to be specially tested or approved, the Contractor shall give the Engineer notice of its readiness for inspection. Such notice shall be a minimum of two working days. If the inspection is by an authority other than the Owner, the Contractor shall furnish the date fixed for such inspection. Inspections by the Owner shall be promptly made and where practicable at the source of supply. If the Engineer instructs the Contractor that inspection of certain phases of the work must be made prior to proceeding, the Contractor shall furnish such inspection, promptly and in such manner as to allow the Contractor to prosecute the work without delay. At such time as the Contractor has completed the work in its entirety the Contractor shall make written request for a final inspection. Such request shall be made no less than seven (7) calendar days prior to the requested date of inspection. An inspection will be made by the Engineer and a determination will be made as to whether or not the work is in fact complete. Acceptance will not be given nor final payment released until all "punch list" items are complete and record drawings have been approved. The "punch list" shall not be considered all-inclusive and, therefore, each requested final inspection may generate additional "punch list" items as the Contractor is responsible for completion of all work described in the contract documents.

B. Authority of Construction Inspector: The Construction Inspector is the construction site representative of the Engineer. The Engineer has delegated his authority to the Construction Inspector to make initial decisions regarding questions which may arise as to the quality or acceptability of materials furnished and work performed and as to the manner of performance and rate of progress of the work under the contract.

The Construction Inspector interprets the intent and meaning of the contract and makes initial decisions with respect to the Contractor's fulfillment of the contract and the Contractor's entitlement to compensation. The Contractor shall deal solely with the Construction Inspector.

C. Inspection of Construction: The Construction Inspector shall have access to the work and to the site of the work and to the places where work is being prepared or where materials, equipment, and machinery are being obtained for the work. If requested by the Construction Inspector, the Contractor shall provide the assistance necessary for obtaining such access, and shall provide information related to the inspection of construction.

D. Change Orders: The Construction Inspector has the authority to initiate or recommend change orders. Such change orders are subject to review and approval by the Owner.

26 - Inspection and Testing of Materials

The Owner shall provide inspection and testing of all materials and workmanship by a testing lab incorporated in the work. Inspection and testing of materials and workmanship shall be at the Owner's discretion and for the purpose of establishing that all material and workmanship have been provided in general accordance with the contract

documents. The Contractor shall give to the Owner a minimum of 48 hours' notice (not to include weekends and holidays) prior to placement of any concrete, fill material, backfill material, street base or sub-base material. Failure of the Contractor to give such notice shall be cause for the Owner to suspend operations of the Contractor which may impact testing. Such suspension of the Contractor's operations shall not be considered an unavoidable delay and any loss sustained by the Contractor shall be borne by the Contractor. The Contractor shall schedule tests with the lab and also notify the construction inspector of this action. The Contractor shall be responsible for the payment of retesting of failed tests and for standby costs due to the failure of the Contractor or their suppliers to be ready for the testing procedure so scheduled by the Contractor.

Material or workmanship which does not meet the requirements of the contract documents shall be removed and replaced by the Contractor immediately and at the Contractor's expense. Subsequent inspection or testing of said material or workmanship shall be provided by the Owner. However, all costs associated with said subsequent inspection or testing shall be deducted from monies otherwise due the Contractor.

Inspection and testing by the Owner shall be in addition to all inspections or tests required of manufacturers or suppliers by the contract documents, applicable manufacturing standards, Federal, State or Local laws or by the Contractor for materials, equipment, or workmanship. Failure of the Owner to make any inspection or test shall not relieve the Contractor of his obligation to provide materials and workmanship or otherwise perform in accordance with the contract documents.

27 - Substantial Completion

At such time as the Contractor has completed the work and prior to requesting a final inspection, the Contractor shall make written request for an inspection for substantial completion. Such request shall be made no less than seven (7) calendar days prior to the requested date of inspection. An inspection will be made by the Engineer and a determination will be made as to whether or not the work is, in fact, substantially complete and a "punch list" will be developed. "Punch Lists" containing numerous items or items which may affect the intended use of the work will be considered cause to delay issuance of a Certificate of Substantial Completion. Operation and Maintenance manuals shall be submitted and approved prior to issuance of any Certificate of Substantial Completion. The use of Substantial Completion will not be used, unless called for in Section 00 1600.

28 - Rights of Various Interests

Wherever work being done by the Owner's forces or by other Contractors is contiguous to work covered by this Contract, the respective rights of the various interests involved shall be established by the Engineer to secure the completion of the various portions of the work in general harmony.

29 - Separate Contracts

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

and coordinate the Contractor's work with theirs.

30 - Subcontractors

The Contractor shall notify the Engineer in writing of the names and addresses of all proposed Subcontractors for the work at the Preconstruction Meeting. Subcontractors will not be recognized as having a direct relationship with the Owner. The persons engaged in the work, including employees of subcontractors and suppliers, will be considered employees of the Contractor and their work shall be subject to the provisions of the contract. References in the contract documents to actions required of subcontractors, manufacturers, suppliers, or any person, other than the Contractor, the Owner, the Engineer or the Construction Inspector, shall be interpreted as requiring that the Contractor shall require such subcontractor, manufacturer, supplier or person to perform the specified action.

A subcontractor for any part of the work must have experience on similar work and, if required, furnish the owner with a list of projects and the Owners or Engineers who are familiar with their competence.

31 - Access

The Contractor shall maintain access to the property owners adjacent to the Project covered by the Contract.

32 - Construction Schedule and Procedures

The Contractor shall submit and continually update a time schedule for the work and a sequence of operations.

Before starting any work, and from time to time during its progress, as the Engineer may request, the Contractor shall outline to the Engineer the methods he plans to use in doing the work, and the various steps he intends to take. Failure of the Engineer to reject the methods or steps proposed by the Contractor shall not relieve the Contractor of his responsibility for the correct and timely performance of the work.

33 - Project Management

The Contractor shall schedule and coordinate the work of the Contractor and all subcontractors and others involved to maintain the accepted progress schedule. The Contractor's duties shall also include the planning of the work, the scheduling of ordering and delivery of materials, and checking and control of all work under this contract.

The Contractor shall be responsible for complete supervision and control of their subcontractors as though they were his own forces. Notice to the Contractor shall be considered notice to all affected subcontractors.

34 - Entry

The right of access to the work wherever it is in preparation or progress shall be

extended to the Owner and representatives of appropriate regulatory agencies. The Contractor shall provide facilities for such access and inspection.

35 - Restoration

The Contractor shall conduct his operations so that restoration of roadways, driveways, curb and gutter, ditches and easements progresses with the work. If the Engineer determines that inadequate progress is being made with the restoration, he may shut-down the Contractor's operations until the restoration is caught up. Such a shut-down shall be considered required due to the failure of the Contractor to perform as described in this paragraph and therefore shall not constitute a time delay and/or unavoidable delay for the Contractor. Any cost associated with such shut-down as described in this paragraph, including re-mobilization, shall be borne by the Contractor.

Any areas that are disturbed and work is subsequently suspended by the Contractor for a period of more than 24 hours shall be cleaned of debris and shall be graded so as to facilitate effective drainage. Street signs, mailboxes, fences, planters, etc. shall be restored within 24 hours of disturbance. The Contractor shall make inspections of all areas disturbed since the commencement of construction for the purpose of insuring restoration efforts have been effective. Such inspections shall be made daily and deficiencies shall be corrected within 24 hours.

In the event the restoration is not done, the Owner shall reserve the right to employ others to perform the restoration work. The Owner will back charge the Contractor for this service.

36 - Completion of "Punch List" Items

Prior to **completion** of the project, the Contractor shall request an inspection and any deficiencies found at that time will be noted on a "Punch List." The development of a "Punch List" shall not delay or terminate the accumulation or assessment of liquidated damages as established in Section 00 1500, Paragraph 86.

37 - Authority of Contractor

A. Contractor's Representative:

The Contractor shall notify the Owner in writing of the name of the person who will act as the Contractor's representative and shall have the authority to act in matters relating to this contract. This person shall have authority to carry out the provisions of the contract and to supply materials, equipment, tools and labor without delay for the performance of the work.

B. Construction Procedures:

The Contractor shall supervise and direct the work. He has the authority to determine the means, methods, techniques, sequences and procedures of construction, except in those instances where the Owner, to define the quality of an item of work, specifies in the contract a means, method, technique, sequence or procedure for the

construction of that item of work.

38 - Authority of Engineer

The Project Engineer is the authorized representative of the Owner. All direction to the Contractor shall be provided only by the Project Engineer.

39 - Owner-Contractor Coordination

A. Service of Notice:

Notice, order, direction, request or other communication given by the Engineer to the Contractor shall be deemed to be well and sufficiently given to the Contractor if left at any office used by the Contractor or delivered to any of his offices, clerks or employees or posted at the site of any work or mailed to any post office addressed to the Contractor at the address given in the contract document or mailed to the Contractor's last known place of business. If mailed by first-class mail, any form of communication shall be deemed to have been given to and received by the Contractor two days after the day of mailing.

B. Suggestions to Contractor:

Plan or method of work suggested by the Engineer to the Contractor but not specified or required, if adopted or followed by the Contractor in whole or in part, shall be used at the risk and responsibility of the Contractor. The Engineer assumes no responsibility therefore and in no way will be held liable for any defects in the work which may result from or be caused by the use of such plan or method of work.

C. Cooperation:

The Contractor agrees to permit entry to the site of the work by the Owner or other Contractors performing work on behalf of the Owner. The Contractor shall afford the Owner, other subcontractors and their employees, reasonable facilities and cooperation and shall arrange his work and dispose of his materials in such a manner as to not interfere with the activities of the Owner or of others upon the site of the work. The Contractor shall promptly make good any injury or damage that may be sustained by other Contractors or employees of the Owner at his hands. The Contractor shall join his work to that of others and perform his work in proper sequence in relation to that of others.

If requested by the Contractor, the Owner shall arrange meetings with other Contractors performing work on behalf of the Owner to plan coordination of construction activities. The Owner shall keep the Contractor informed of the planned activities of other Contractors.

Differences or conflicts arising between the Contractor and other Contractors employed by the Owner or between the Contractor and the works of the Owner, with regard to their work, shall be submitted to the Engineer for his decision in the matter. If the work of the Contractor is affected or delayed because of any act or omission of other Contractors or of the Owner, the Contractor may submit, for the Engineer's consideration, a documented request for a change order.

40 - Interpretation of Specifications and Drawings

A. General:

The specifications and drawings are intended to be explanatory of each other. Work specified on the drawings and not in the specifications, or vice versa, shall be executed as if specified in both.

B. Request for Clarification:

In the event the work to be done or matters relative thereto are not sufficiently detailed or explained in the contract documents, the Contractor shall apply to the Engineer for further explanations as may be necessary and shall conform thereto so far as may be consistent with the terms of the contract. In the event of doubt or question arising respecting the true meaning of the specifications or drawings, reference shall be made to the Engineer for his decision.

41 - Discrepancies in Specifications and Drawings

A. Errors and Omissions:

If the Contractor, in the course of the work, becomes aware of any claimed errors or omissions in the contract documents or in the Owner's field of work, he shall immediately inform the Engineer in writing. The Engineer shall promptly review the matter and if he finds an error or omission has been made, he shall determine the corrective actions and advise the Contractor accordingly. If the corrective work associated with an error or omission increases or decreases the amount of work called for in the contract, the Engineer shall issue an appropriate change order. After discovery of an error or omission by the Contractor, related work performed by the Contractor shall be done at his risk unless authorized, in writing, by the Engineer.

B. Conflicting Provisions:

In cases of conflict between the specifications and drawings, the specifications shall govern. Figure dimensions on drawings shall govern over scale dimensions and detail drawings shall govern over general drawings. In the event an item of work is described differently in two or more locations on the drawings and in the specifications, the Contractor shall request a clarification from the Engineer. For any event where the Contractor claims any ambiguities or discrepancies within the specifications, the Contractor may assume that the higher, greater and most stringent specification or standard applies.

42 - Material, Equipment and Workmanship

Unless otherwise specifically stated in the contract documents, the Contractor shall provide and pay for material, labor, tools, equipment, water, light, power, transportation, supervision, and temporary construction of any nature, and other services and facilities of any nature, whatsoever necessary, to execute, complete and deliver the work within the specified time. Material and equipment shall be new and of the quality specified. Equipment offered shall be current modifications which have been in successful regular

operation under comparable conditions. Construction work shall be executed in conformity with the standard practice of the trade.

43 - Demonstration of Compliance with Contract Requirements

A. Inspection:

To demonstrate his compliance with the contract requirements, the Contractor shall assist the Engineer in his performance of inspection work. The Contractor shall grant the Engineer access to the work and to the site of the work, and to the places where work is being prepared, or whence materials, equipment or machinery are being obtained for the work. The Contractor shall provide information requested by the Engineer in connection with inspection work.

If the contract documents, laws, ordinances, or any public regulatory authority require parts of the work to be specially inspected, tested or approved, the Contractor shall give the Engineer adequate prior written notice of the availability of the subject work for examination.

If parts of the work are covered in contravention of the Engineer's directive, the cost of exposing the work for inspection and closing shall be borne by the Contractor regardless of whether or not the work is found to be in compliance with the contract.

If any work is covered in the absence of the Engineer's directive to the contrary, the Contractor shall, if directed by the Engineer, uncover, expose or otherwise make available for inspection, portions of covered work. If it is found that such work is defective, the Contractor shall bear the expense of uncovering and reconstructing. If the work is found to be in compliance with the contract, the Contractor will be allowed an increase in the contract price or an extension in the contract time, or both via a change order.

B. Certification:

In cases where compliance of materials or equipment to contract requirements is not readily determinable through inspection and tests, the Engineer shall request that the Contractor provide properly authenticated documents, certificates or other satisfactory proof of compliance. These documents, certifications and proofs shall include performance characteristics, materials of construction and the physical or chemical characteristics of materials.

C. Inspection at Point of Manufacturing:

If inspection and testing of materials or equipment in the vicinity of the work by the Owner is not practical, the specifications may require that such inspection and testing or witnessing of tests take place at the point of manufacture. In this case and in the event the remote inspection and testing is not specified and is requested by the Owner, the required travel, subsistence, and labor expenses shall be paid by the Owner. If the Contractor requests the Owner to inspect and test material or equipment at the point of manufacture, then the additional costs to the Owner for travel, subsistence, and labor expenses shall be paid by the Contractor.

44 - Project Meetings

1.0 General

Project meetings will be held on site as often as deemed necessary by the Engineer throughout the construction period. Meetings will normally be held monthly. Contractor's representatives shall attend.

The purpose of the meetings will be to discuss schedule, progress, coordination, submittals and job-related problems.

45 - Overtime and Shift Work

Overtime and shift work may be established as a regular procedure by the Contractor with reasonable notice and written permission of the Owner. No work other than overtime and shift work established as a regular procedure shall be performed between the hours of 6:00 p.m. and 7:00 a.m. nor on Sundays or holidays except such work as is necessary for the proper care and protection of the work already performed or in case of an emergency.

Contractor agrees to pay the Owner's costs of overtime inspection except those occurring as a result of overtime and shift work established as a regular procedure. Overtime inspection shall include inspection required during holidays and weekends, and between the hours of 6:00 p.m. and 7:00 a.m. on weekdays. Costs of overtime inspection will cover engineering, inspection, general supervision and overhead expenses which are directly chargeable to the overtime work. Contractor agrees that Owner shall deduct such charges from payments due the Contractor.

46 - Construction Schedule

1.0 Scope:

This section specifies reports and schedules for planning and monitoring the progress of the work.

2.0 Description:

The Contractor shall provide a graphic construction schedule (bar chart) indicating various subdivisions of the work with no task exceeding 90 days in duration and the dates of commencing and finishing each. All items shall correspond to the items shown on the schedule of values as required in Section 00 1500, Paragraph 75. The schedule will also show major equipment submittals and review time. The schedule shall show the time allowed for testing and for other procedures which must be completed prior to the work being put into operation. The schedule will take into account the time of completion and work sequence. The Contractor shall also provide a listing of start and stop dates and durations of all activities listed in the schedule.

3.0 Submittal Procedures:

Within ten (10) days after Notice of Award of the Bid, the Contractor shall submit six (6) copies of the construction schedule to the City Project Engineer.

Within fourteen (14) calendar days after receipt of the submittal, the City Project Engineer shall review the submitted schedule and return two copies with comments to the Contractor. If the City Project Engineer finds that the submitted schedule does not comply with specified requirements, the corrective revisions will be noted on the submittal copy returned to the Contractor.

4.0 Schedule Revisions:

Revisions to the accepted construction schedule may be made only with the written approval of the Contractor and Owner. A change affecting the contract value of any activity, the completion time, and sequencing shall be made in accordance with applicable provisions of Section 00 1500, Paragraph 82.

5.0 Project Status Update:

Project status, review and update shall be provided with each pay request and at least monthly as specified in Section 00 1500, Paragraph 79.

47 - Quality

Where the contract requires that materials or equipment be provided or that construction work be performed, and detailed specifications of such materials, equipment or construction work are not set forth, the Contractor shall perform the work using materials and equipment of the best grade in quality and workmanship obtainable in the market from firms of established good reputations, and shall follow standard practices in the performance of construction work. The work performed shall be in conformity and harmony with the intent to secure the standard of construction and equipment of work as a whole and in part.

48 - Material and Equipment Specified By Name

A. GENERAL

When material or equipment is specified by reference to two or more patents, brand names, or catalog numbers followed by "or equal," it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements, and that other materials or equipment, of equal capacities, quality and function shall be considered by the Owner upon the Contractor's request for substitution. Requests for substitution shall be made in accordance with Section 00 1500, Paragraph 50.

B. SINGLE SOURCE PRODUCTS:

If material or equipment is specified by one or more patents or proprietary names or by the name of only one manufacturer not followed by "or equal," substitutions will not be considered.

49 - Submittal Procedure

1.0 General

The Contractor shall submit descriptive information which will enable the Engineer to determine whether the Contractor's proposed materials, equipment, or methods of work are in general conformance to the design concept and in compliance with the drawings and specifications.

2.0 Contractor's Responsibilities

The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the material, equipment, or method of work shall be as described in the submittal. The Contractor shall verify in writing that all features of all products conform to the requirements of the specifications and drawings. Submittal documents shall be clearly edited to indicate only those items, models, or series of material or equipment which are being submitted for review. All extraneous materials shall be crossed out or otherwise obliterated. The Contractor shall insure that there is no conflict with other submittals and shall notify the Engineer in each case where his submittal may affect the work of another Contractor or the Owner. The Contractor shall insure coordination of submittals among the related crafts and subcontractors.

The Contractor may authorize in writing a material or equipment supplier to deal directly with the Engineer with regard to a submittal. These dealings shall be limited to contract interpretations.

3.0 Transmittal Procedure

A. General

Submittals regarding material and equipment shall be accompanied by the Submittal Transmittal Form. A separate form shall be used for each specific item, class of material, or piece of equipment. Submittal documents common to more than one piece of equipment shall be identified with all the appropriate equipment numbers and specification section and paragraph. Submittals for various items shall be made with a single form when the items taken together constitute a manufacture's package or are so functionally related that expediency indicates checking or review of the group or package as a whole.

A unique number, sequentially assigned, shall be noted on the transmittal form accompanying each item submitted. Original submittal numbers shall have the following format: "XXX;" where "XXX" is the sequential number assigned by the Contractor. Resubmittals shall have the following format: "XXXY;" where "XXX" is the originally assigned submittal number and "Y" is a sequential letter assigned for resubmittals, i.e., A, B, or C being the first, second, and third resubmittals, respectively. Submittal 026B, for example, is the second resubmittal of submittal 026.

B. Deviation from the Contract

If the Contractor proposes to provide material, equipment, or method of work which deviates from the project manual, he shall indicate so under "deviations" on the transmittal form accompanying the submittal copies.

C. Submittal Completeness

Submittals which do not have all the information required to be submitted, including deviations, are not acceptable and will be returned without review.

4.0 Review Procedure

Review shall not extend to means, methods, techniques, sequences, or procedures of construction, or to verifying quantities, dimensions, weights or gages, or fabrication processes, or to safety precautions, or programs incident thereto. Review of a separate item, as such, will not indicate approval of the assembly in which the item functions.

The Contractor shall submit six copies of all specified information. Unless otherwise specified, within 30 calendar days after receipt of the submittal, the Engineer shall review the submittal and return one copy of the submittal with comments. The returned submittal shall indicate one of the following actions:

1. If the review indicates conformance with the drawings and specifications, submittal copies will be marked "NO EXCEPTIONS TAKEN." In this event, the Contractor may begin to implement the work or incorporate the material or equipment covered by the submittal.

2. If the review indicates limited corrections are required, submittal copies will be marked "MAKE CORRECTIONS NOTED." The Contractor may begin implementing the work or incorporate the materials or equipment covered by the submittal in accordance with the noted corrections. Where submittal information will be incorporated in O&M data, a corrected copy shall be provided.

3. If the review indicates that the submittal is insufficient or contains incorrect data, submittal copies will be marked "AMEND AND RESUBMIT." Except at his own risk, the Contractor shall not undertake work covered by this submittal until it has been revised, resubmitted and returned marked either "NO EXCEPTION TAKEN" or "MAKE CORRECTIONS NOTED."

4. If the review indicates that the submittal does not comply with the plans and specifications, submittal copies will be marked "REJECTED - SEE REMARKS." Submittals with deviations which have not been clearly identified will be rejected. Except at his own risk, the Contractor shall not undertake work covered by this submittal until it has been revised, resubmitted and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."

5.0 Effect of Review of Contractor's Submittals

Review of drawings, methods of work, or information regarding materials or equipment the Contractor proposed to provide, shall not relieve the Contractor of his

responsibility for errors and omissions therein and shall not be regarded as an assumption of risks or liability by the Owner or by any officer or employee thereof, and the Contractor shall have no claim under the contract on account of the failure, or partial failure, or the method of work, material, or equipment so reviewed. A mark of "NO EXCEPTION TAKEN" or "MAKE CORRECTIONS NOTED" shall mean that the Owner has no objection to the Contractor, upon his own responsibility, using the plan or method of work proposed, or providing the materials or equipment proposed.

50 - Requests for Substitution

The Contractor may offer material or equipment of equal or better quality and performance in substitution for those specified as described in Section 00 1500, Paragraph 48. The Owner will consider offers for substitution only from the Contractor and will not acknowledge or consider such offers from suppliers, distributors, manufacturers, or subcontractors. The Contractor's offers of substitution shall be made in writing to the Engineer and shall include sufficient data to enable the Engineer to assess the acceptability of the material or equipment for the particular application and requirements.

If the offered substitution necessitates changes to or coordination with other portions of the work, the data submitted shall include drawings and details showing such changes. Contractor agrees to perform these changes as part of the substitution of material or equipment at no additional cost to the Owner. Within thirty (30) calendar days after receipt of the offer of substitution, the Engineer will review the material submitted by the Contractor and advise the Contractor of objections, if any, to the proposed substitution. Such action shall not relieve the Contractor from responsibility for the efficiency, sufficiency, quality and performance of the substitute material or equipment, in the same manner and degree as the material and equipment specified by name. Any cost differential associated with a substitution shall be reflected in the offer and the contract documents shall be modified by a change order.

51 – Manufacturer's Directions

Manufactured articles, material and equipment shall be applied, installed, connected, erected, adjusted, tested, operated and maintained as recommended by the manufacturer, unless otherwise specified. Manufacturer's installation instructions and procedures shall be provided prior to installation of the manufactured articles, material and equipment.

52 - Product Data

Data required by the Owner for inspecting, testing, operating or maintaining parts of the work shall be provided by the Contractor. Unless otherwise specified, such information shall consist of six (6) copies and shall be provided at the time the referenced material or equipment is delivered to the job site. The data shall include such items as shop drawings, erection drawings, reinforcing steel schedules, testing and adjusting instructions, operations manuals, maintenance procedures, parts lists and record drawings. When applicable, information and data to be provided shall be identified by the specified equipment number. Extraneous material on the pages or drawings provided shall be crossed out, and the equipment or material to be supplied shall be clearly marked. Such

information is to be provided as part of the work under this contract and its acceptability determined under normal material submittal procedures. The certificate of substantial completion shall not be issued for any portion of the work for which complete product data has not been submitted and approved.

53 - Operation and Maintenance Information

Six (6) complete sets of operation and maintenance information shall be provided for all mechanical and electrical equipment. Such operating and maintenance information shall consist of the name and address of the manufacturer, the nearest representative of the manufacturer, and the nearest supplier of the manufacturer's equipment and parts. In addition, the following items of information shall be provided where applicable.

1. Lubrication Information: This shall consist of the manufacturer's recommendations regarding the lubricants to be used and the lubrication schedule to be followed.

2. Control Diagrams: Diagrams shall show internal and connection wiring.

3. Start-up Procedures: These instructions consist of the equipment manufacturer's recommendations for installation, adjustment, calibration, and troubleshooting.

4. Operating Procedures: These instructions consist of the equipment manufacturer's recommended step-by-step procedures for starting, operating, and stopping the equipment under specified modes of operation.

5. Preventive Maintenance Procedures: These instructions consist of the equipment manufacturer's recommended steps and schedules for maintaining the equipment.

6. Overhaul Instructions: These instructions consist of the manufacturer's directions for the disassembly, repair and reassembly of the equipment and any safety precautions that must be observed while performing the work.

7. Parts List: This list consists of the generic title and identification number of each component part of the equipment.

8. Spare Parts List: This list consists of the manufacturer's recommendations of numbers of parts which should be stored by the Owner and any special storage precautions which may be required.

9. Original warranties as required by the contract documents and as supplied by the manufacturer.

54 - Record Drawings

It shall be the primary responsibility of the Project Consulting Engineer to gather and prepare detailed information in the field for preparation of record drawings on a monthly basis prior to the Owner approving payments to the Contractor. However, the Contractor shall maintain a neat set of updated construction drawings and note on these drawings in color any revisions, including any descriptive notes relative to these revisions, and the location of water and sewer laterals. These plans shall be available during normal working hours at the job site for review by the City's/consultant's project inspector, and at the completion of the project shall become the property of the Owner and shall be delivered to the City's Project Engineer. Failure to do so will result in monies being withheld from the Contractor's final payment.

55 - Protection of the Public and Property

The Contractor shall provide and maintain all necessary watchmen, barricades, lights, flagmen and warning signs and take all necessary precautions for the protection of the public. The Contractor shall provide a plan at the Pre-construction meeting.

56 - Protection of the Owner's Property

The Contractor shall continuously maintain adequate protection of all work from damage, and shall take all reasonable precautions to protect the Owner's property from injury or loss arising in connection with this Contract. The Contractor shall adequately protect adjacent private and public property, as provided by Law and Contract Documents.

Before parking any heavy equipment on property of the City of Savannah, the Contractor must request and receive permission from the Owner.

57 - Maintenance of Traffic and Sequence of Operations:

A. GENERAL: The following conditions will apply:

1. A traffic control plan shall be submitted for approval by the City Traffic Engineering Director, hereinafter referred to in this section as the Traffic Engineer, prior to any construction operations. Furthermore, a right-of-way permit must be obtained from the Traffic Engineering Department.

2. All signage for construction operations, lane and street closures, as well as detours, shall be performed in accordance with the current Federal and State Manual on Uniform Traffic Control Devices as well as the current revision of the City of Savannah Traffic Engineering Manual on Traffic Controls and Temporary Street Construction and Maintenance.

3. The work shall be arranged and conducted so that it can be performed with the least interference to all vehicular and pedestrian traffic.

4. No property owner shall be denied vehicular access to their property for any length of time, other than that as determined by the Traffic Engineer, is absolutely necessary.

5. Two-way traffic must be maintained on all public roads and streets, except that during periods of off-peak use, one-way traffic, properly controlled by a certified DOT flagman, will be permitted at the discretion of the Engineer. Each time there is to be a change in the number of lanes open to traffic, it shall be approved by the Engineer.

6. The Traffic Engineer may approve detours around construction sites when one open traffic lane is not feasible.

7. For closing of minor residential streets, a 24 hour advance notice is required.

8. For lane closures involving signalized intersections or arterial streets, a 48 hour advance notice is required.

9. Complete street closures involving collectors and arterial streets, requiring a traffic detour, require 4 working days advance notice in order to coordinate a news release.

10. Construction is not to be permitted on City streets between the hours of 10:00 P.M. through 6:00 A.M., except under emergency situations with the approval of the Traffic Engineer.

11. In order to provide the greatest possible convenience to the public, the Contractor shall remove all lane closure markings and devices immediately when work is complete or temporarily suspended for any length of time.

B. Safety

1. The Contractor performing the work shall be responsible for the erection and maintenance of all traffic control devices during construction.

2. At the end of work each day, the Contractor shall remove all equipment, tools, and any other hazards in the traveled portion of the roadway.

3. When construction necessitates suspension of an existing traffic signal operation, the Contractor shall furnish, at his expense, an off-duty police officer to regulate and maintain traffic control at the site.

C. Enforcement

In the event that compliance with these measures is not achieved, the Engineer may shut down all operations being performed. The Traffic Engineer shall also withhold any payments due until the above requirements have been met. At any time during the course of the work, the Traffic Engineer may, at his discretion and by whatever means necessary, correct any situation that he deems hazardous to the health and welfare of the public. Work performed by the Traffic Engineer, or any entity enlisted by the Traffic Engineer, to correct situations of public hazard shall be deducted from monies due the Contractor.

D. Compensation

There will be no separate pay item for maintenance of traffic or for coordination of the Sequence of Operations.

58 - Lot Corners

In the course of the construction work, it may be necessary to disturb and remove the established lot or property corners of some of the properties. The Contractor shall be required to record all property corners and replace them after the construction is completed. All lot or property corners removed as described above, or all lot or property corners destroyed by the Contractor's operations, shall be replaced at the expense of the Contractor by a Land Surveyor registered in the State of Georgia. The Contractor shall provide certification from the Land Surveyor for all reset property corners.

59 - Existing Utilities

All known utility facilities are shown schematically on the plans and are not necessarily accurate in location as to plan or elevation. Utilities such as service lines or unknown facilities not shown on the plans will not relieve the Contractor of his responsibility under this requirement. The Contractor shall be responsible for the cost of repairs to any damaged underground facilities; even when such facilities are not shown on the plans. The Contractor shall contact all utility companies prior to beginning work and request an accurate location of their respective utilities. "Existing Utility Facilities" shall mean any utility that exists on the project in its original, relocated or newly installed position.

The Contractor shall call, by law, the Utilities Protection Center, d/b/a Georgia 811 at "811" or 1-800-282-7411 and shall request that all owners of utilities, including gas companies, electric companies, telephone companies, cable television companies and governmental units, prior to starting any excavation of the project, locate and mark their respective facilities.

All Contractor's operations shall be conducted so as to interfere as little as possible with utility service. Any proposed interruption by the Contractor must be approved in advance by the respective utility's owner.

The existence and location of underground utilities will be investigated and verified in the field by the Contractor before starting work. The location of all known interferences based on the best information available has been shown on the drawings, but this information may not be complete or accurate.

Water lines and gas lines and appurtenances and sewer lines uncovered by the Contractor shall be protected and kept in service by the Contractor and the Contractor shall notify the respective utility's owner that the line has been or will be uncovered. The Contractor shall use adequate braces and slings or other appropriate methods to keep the lines in service, and any repairs made necessary by his operation shall be made at the Contractor's expense.

The Contractor shall familiarize himself with and comply with the provisions of O.C.G.A. Section 25-9-1 et. seq.

If any public or private utility lines, pipes, facilities, or structures are damaged or broken by the operations of the Contractor as a result of being disturbed, exposed or unsupported, the Contractor shall be responsible for the complete and prompt restoration

of the same and shall hold the City harmless from any claims or causes or action for damage and for any liability which may arise therefrom.

The Contractor is responsible for coordinating with the respective utility's owner any relocation, adjustment, holding or replacement of utility facilities.

Power poles to be relocated shall be moved by the Georgia Power Company or the respective power company serving the area. Telephone poles shall be moved by AT&T or the respective telecommunications company servicing the area. Gas lines to be relocated or lowered shall be moved by AGL Resources or the respective gas company servicing the area. The relocation, holding or replacement of any existing utilities shall be considered consequential to the work and any cost associated therewith shall be borne by the Contractor.

60 - Special Protection of Trees

The Contractor shall comply with the City Tree Ordinance. Refer to Section 00 2100, "Clearing and Tree Protection," for procedures and requirements.

61 - Material Delivery, Handling, and Storage

The Contractor shall schedule and sequence the delivery of material and equipment such that installation can be accomplished in a timely manner. The Contractor shall thoroughly examine all material and equipment upon delivery and shall not accept delivery of defective or damaged material or equipment.

Nylon slings and chokers shall be used for lifting all material and equipment. Chains, cables, wire rope, or other such items that may cause change to factory applied coatings shall not be used for handling of material or equipment.

Material and equipment shall be stored as compactly and neatly as practicable at points convenient for the Contractor and which do not damage the work or interfere with or are otherwise hazardous to traffic. Material and equipment shall be stored so as to facilitate inspection and to insure preservation of their quality and fitness for use. All material and equipment shall be stored on wooden skids or platforms such as not to be in direct contact with the ground. All mechanical and electrical equipment shall be stored and covered in a manner such as to completely be protected from dust and moisture. Prior to the delivery of any materials or equipment the Contractor shall submit, for the Engineers approval, a plan showing all designated storage and assembly areas. Should the Contractor choose to store material or equipment or use for assembly property which is not owned by the City of Savannah or the Contractor, a letter of permission signed by the legal owner of the property shall be obtained by the Contractor and submitted to the Engineer a minimum of 24 hours prior to delivery. All material and equipment stored at any facility other than the site shall be tagged with the Owner's name and the project number. Payment shall not be made for "Stored Materials" for any material stored at locations or in any manner not suitable to the Owner.

62 - Maintenance During Construction

The Contractor shall maintain the work from the beginning of construction operations until final acceptance of the Project. This maintenance shall constitute continuous and effective work prosecuted day by day with adequate equipment and forces to the end that roadways or structures are kept in satisfactory condition at all times, including satisfactory signing or marking as appropriate, and control of traffic where required by use of traffic control devices as required by the State of Georgia.

Upon completion of the work, the Contractor shall remove all construction signs and barricades before final acceptance of the Project.

63 - Emergencies

In an emergency affecting the safety of life or of the work or of adjoining property, the Contractor is, without special instructions or authorization from the Owner, hereby permitted to act at his discretion to prevent such threatening loss or injury. He shall also act, without appeal, if so authorized or instructed by the Owner. The Contractor shall supply the Engineer with two (2) emergency phone numbers for contact 24 hours per day in the event of an emergency. After attempting contact with the Contractor via the emergency phone numbers, the Contractor cannot be reached or should fail to respond, the Owner may remedy the situation by whatever means as may be necessary and deduct the cost for same from any monies due the Contractor.

64 - Compensation

Any compensation claimed by the Contractor due to emergency work shall be determined by force account.

65 - Safety and Health

The Contractor shall comply with Safety and Health Regulations for Construction, promulgated by the Secretary of Labor under Section 107 of the Contract Work Hours and Safety Standards Act, as set forth in Title 29, C.F.R. Copies of these regulations may be obtained from Labor Building, 14th and Constitution Avenue N.W., Washington, D.C. 20013.

The Contractor shall also comply with the provisions of the Federal Occupational Safety and Health Act as amended and the High Voltage Act of the State of Georgia, O.C.G.A. Section 46-3-30 through 46-3-40, and all federal, state, county, and city codes, regulations, and standards.

66 - Accidents

The Contractor shall provide at the site such equipment and medical facilities as are necessary to supply first-aid service to anyone who may be injured in connection with the work. The Contractor shall report in writing to the Owner all accidents whatsoever arising out of, or in connection with, the performance of the work, whether on or adjacent to the site, which causes death, personal injury, or property damages, giving full details and

statement of witnesses. In addition, if death or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Contractor and any subcontractor an account of any accident, the Contractor shall promptly report the facts to the Owner, giving full details in writing of the claim.

The Contractor shall provide his Superintendent and Foreman, who are on the site of the work, the name of the hospital and telephone number and the name and phone number of the doctor he proposes to use in case of accident.

67 - Load Limits

The Contractor shall be governed by the local load limit requirements of the Georgia Standard Specifications on State, County or City maintained roadways. The Contractor shall be responsible for his damage to existing streets and roads.

68 - Sanitary Provisions

The Contractor shall provide temporary sanitary facilities for the use of the workmen during the progress of the work. The sanitary facilities shall conform to the requirements of the Federal Occupational Safety and Health Administration. All facilities shall be removed at the completion of the Contract.

69 - Construction Buildings

Should the Contractor desire, he may erect structures for housing tools, machinery and supplies; structures will be permitted only at places approved by the Owner. Their surroundings shall be maintained at all times in a sanitary and satisfactory manner. On or before the completion of the work, all such structures shall be removed, together with all rubbish and trash, and the site shall be restored to its original condition at the expense of the Contractor. Structures will not be permitted for the housing of workers.

70 - Cleaning Up

The Contractor shall, as directed by the Owner, remove at his own expense from the Owner's property and from all public and private property all temporary structures, rubbish and waste materials resulting from his operations. Clean-up shall be concurrent with the work. Where complete restoration is not reasonable until testing or inspection is complete, the Contractor shall, at minimum, remove all debris and trash and perform grading such that the area is left neat and without depressions that may hold water. The sufficiency of temporary clean-up shall be at the discretion of the Engineer.

71 - Electrical Energy

The Contractor shall make all necessary applications and arrangements and pay all fees and charges for electrical energy for power and light required for the proper completion of this contract during its entire progress. The Contractor shall provide all temporary wiring, switches, connections and meters.

There shall be sufficient artificial light, by means of electricity, so that all work may

be done in a workmanlike manner when there is not sufficient daylight.

The Contractor shall remove all temporary electrical service and appurtenances prior to final acceptance by the Owner. Where permanent electrical service is required, the Contractor shall request, in writing, an inspection of the electrical components of the work. Such request for inspection shall be given a minimum of 48 hours in advance. At such time as the electrical components of the work have been inspected and approved, the Contractor shall request from the Owner, in writing, an electrical service. Such request for electrical service shall be given a minimum of ten (10) days in advance.

72 - Water Supply

The Contractor shall provide all water required to successfully perform the work. All water provided by the Contractor which is not potable shall be clearly marked as such. All water from fire hydrants, post hydrants, or otherwise from the existing distribution system of the City of Savannah shall be metered with a meter supplied by the City of Savannah Water Department and shall be obtained only with written authorization of the Owner. The Contractor shall be required to pay all costs associated with meters or back flow prevention devices.

73 - Environmental Impact

The Contractor shall conduct his operations so as to minimize, to the greatest extent possible, adverse environmental impact.

A. Noise. All equipment and machinery shall be provided with exhaust mufflers maintained in good working order so as to reduce operating noise to minimum levels. In addition, operation of equipment and machinery shall be limited to daylight hours, except with the permission of the Owner, based on critical need for the operation.

B. Dust/Smoke. All equipment movements shall be accompanied by a minimum of dust. Traveled surfaces and earthwork shall be maintained in a moist condition to avoid the generation of dust or the airborne movement of particulate matter under all prevailing atmospheric conditions.

C. Traffic. Trucks carrying spoil, fill, concrete or other materials shall be routed over roads which will result in the least effect on traffic and nuisance to the public. All material shall be loaded in a manner which will preclude the loss of any portion of the load in transit, including covering, if necessary.

D. Siltation. All points of concentrated runoff from rainfall shall be visually monitored to determine that no eroded material leaves the construction site. Measures shall be taken to promptly eliminate offsite deposition of eroded material, including the installation of silt fencing and detention basins.

74 - Monthly Payments

This section is to control payments and is entered into instead of the Georgia prompt payment act OCGA 13-11-1. Not later than the fifth day of every month the

Contractor shall prepare and submit a Request for Periodic Payment, along with an Affidavit of Payment of Claims, covering the total quantities under each item of work that has been completed from the start of the job up to and including the last day of the preceding month, and the value of the work so completed determined in accordance with the schedule of values for such items together with such supporting evidence as may be required by the Engineer. This estimate may also include an allowance for the cost of such materials and equipment required in the permanent work as has been delivered to the site or stored in an approved location and suitably protected but not as yet incorporated in the work. Under no circumstances shall any material or equipment, for which payment has been made by the owner to the Contractor, be sold, returned to the supplier or otherwise moved from storage except for incorporation into the work as covered in this contract without written authorization from the Owner.

Not later than the 30th day after submitting an accepted, approved and correct estimate along with all required documentation (as per these contract documents) as detailed in the above paragraph, the Owner shall, after deducting previous payments made, pay to the Contractor 90% of the amount of the estimate as approved by the Owner, as long as the gross value of completed work is less than 50% of the total Contract amount, or if the Contractor is not maintaining his construction schedule to the satisfaction of the Owner, the Owner shall retain 10% of the gross value of the completed work as indicated by the current approved estimate. After the gross value of completed work becomes equal to 50% of the total Contract amount within a time period satisfactory to the Owner, then the Owner will continue to retain the 10% of the first 50% of the work but will not require any additional retainage; provided, however, that if work is unsatisfactory or falls behind schedule, retention may be resumed at the previous level after notification to the Contractor.

The Contractor shall also submit with each Request for Periodic Payment a progress report (Section 00 1430-1). Failure to submit said form shall be grounds for the Owner to withhold payment.

The City has a right to hold a payment to a Contractor who has not included an updated progress report with his pay request.

Retention of contractual payments and the creation of escrow accounts for contracts for the installation, improvement, maintenance or repair of water or sewer facilities shall be in accordance with the **Georgia Retainage Law, Section 13-10-20, Article 2, as found in O.C.G.A.**

Before final payment is due, the Contractor shall submit evidence satisfactory to the Engineer that all payrolls, material bills, and other indebtedness connected with the work have been paid, except that in case of disputed indebtedness or liens, the Contractor may submit in lieu of evidence of payment an additional Surety Bond satisfactory to the Owner guaranteeing payment of all such disputed amounts when adjudicated.

Special Payment Provision: For a Contractor where payment bonds have been waived, all Request for Periodic Payment forms submitted by the Contractor shall be accompanied by payment affidavits from each subcontractor/supplier for the

services/materials claimed before payment will be released by the Owner. Application for final payment shall also be accompanied by a lien waiver from each (sub)contractor/supplier who furnished labor or materials for the job.

75 - Measurement and Payment

Measurement and payment shall be made for the units or lump sum contract prices shown on the Bid Schedule. Direct payment shall only be made for those items of work specifically listed in the proposal and the cost of other work must be included in the contract price for the applicable item to which it relates.

Within ten (10) days of issuance of the Notice of Award, on lump sum contracts, the Contractor shall provide, for review and approval, a schedule of values for the various subdivisions of the work. No item shall have a value greater than $N/A. The schedule of values shall be submitted on the Request for Periodic Payment Form (Section 00 1420). All items shall correspond to the items shown on the construction schedule as required in Section 00 1500, Paragraph 46.

76 - Use of Completed Portions

The Owner may, at any time during progress of the work, after written notice to the Contractor, take over and place in service any completed portions of the work which are ready for service, although the entire work of the Contract is not fully completed, and notwithstanding the time for completion of the entire work or such portions which may not be expired. In such case, the Owner may issue certificates of substantial completion for such portions of the work as defined in Section 00 1600 (if appropriate), but such taking possession thereof shall not be deemed an acceptance of any other portions of the work, nor of any uncompleted portions, nor of any work not completed in accordance with the Contract Documents. If such prior use increases the cost of or delays the work, the Contractor shall be entitled to such extra compensation, or extension of time, or both, as determined by the Owner. The warranty period will be as defined in Section 00 1500, Paragraph 06. There will be no issue of Substantial Completion, unless defined in Section 00 1600.

77 - Beneficial Use

During the execution of the work certain portions of the work may be directly or indirectly placed in service. However, "beneficial use" shall not be claimed by the Contractor as a means to force acceptance or completion. It shall be the responsibility of the Contractor to request, in writing to the Owner, an inspection to determine acceptance on all or any portion of the work. It shall be the responsibility of the Contractor to consider the amount of time any particular portion of this job may be used prior to Final Acceptance and bid the job accordingly.

78 - Payments Withheld Prior to Final Acceptance

The Owner may withhold or, in the event of subsequently discovered evidence, nullify the whole or part of any certificate of payments to such extent as may be necessary to protect himself from loss on account of:

(a) Defective work not remedied.

(b) Claims filed or reasonable evidence indicating proposed public filing of claims by other parties against the Contractor.

(c) Failure of the Contractor to make payments properly to Subcontractors or for material or labor.

(d) Damage to another Contractor.

When the above grounds are removed or the Contractor provides a Surety Bond, satisfactory to the Owner, which will protect the Owner in the amount withheld, payment shall be made for amount withheld because of them.

79 - Contract Time

A. General

Time shall be of the essence of the contract. The Contractor shall promptly start the work after the date of the notice to proceed and shall prosecute the work so that portions of the project shall be complete within the times specified in Section 00 1500, Paragraph 46. During periods when weather or other conditions are unfavorable for construction, the Contractor shall pursue only such portions of the work as shall not be damaged thereby. No portions of the work, where acceptable quality or efficiency will be affected by unfavorable conditions, shall be constructed while those conditions exist. It is expressly understood and agreed by and between the Contractor and the Owner that the contract time for completion of the work described herein is a reasonable time taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the work.

B. Construction Schedule:

The Contractor shall provide a construction schedule and reports as specified in Section 00 1500, Paragraph 46 for scheduling and coordinating the work within the contract time. Contract time extensions shall be incorporated into updated schedules, reflecting their effect at the time of occurrence. Failure of the Contractor to comply with these requirements for submittal of the construction schedule and reports shall be cause for delay in review of progress payments by the Owner.

C. Construction Progress:

The Contractor shall furnish such manpower, materials, facilities and equipment as may be necessary to insure the prosecution and completion of the work in accordance with the accepted schedule. If work falls fourteen (14) days or more behind the accepted construction schedule, the Contractor agrees that he will take some or all of the following actions to return the project to the accepted schedule. These actions may include the following:

1. Increase manpower in quantities and crafts.

2. Increase the number of working hours per shift, shifts per working day, working days per week, or the amount of equipment, or any combination of the foregoing.

3. Reschedule activities.

If requested by the Engineer, the Contractor shall prepare a proposed schedule revision demonstrating a plan to make up the lag in progress and insure completion of the work within the contract time. The proposed revision shall be submitted to the Engineer in accordance with Section 00 1500, Paragraph 46. Upon receipt of an acceptable proposed schedule, the revision to the construction schedule shall be made in accordance with Section 00 1500, Paragraph 22. All actions to return the project to the acceptable schedule are at the Contractor's expense.

The Contractor shall pay all costs incurred by the Owner which result from the Contractor's action to return the project to its accepted schedule. The Contractor agrees that the Owner shall deduct such charges from payments due the Contractor. It is further understood and agreed that none of the services performed by the Engineer in monitoring, reviewing and reporting project status and progress shall relieve the Contractor of responsibility for planning and managing construction work in conformance with the construction schedule.

D. Delays:

1. Notice of Delays: When the Contractor foresees a delay in the prosecution of the work and, in any event, immediately upon the occurrence of a delay which the Contractor regards as unavoidable, he shall notify the Engineer in writing of the probability of the occurrence of such delay, the extent of the delay, and its possible cause. The Contractor shall utilize that which is set forth herein (Section 00 1440) in reporting such delay. The Contractor shall take immediate steps to prevent, if possible, the occurrence or continuance of the delay. If this cannot be done, the Engineer shall determine how long the delay shall continue and to what extent the prosecution and completion of the work are being delayed thereby. He shall also determine whether the delay is to be considered avoidable or unavoidable and shall notify the Contractor of his determination. The Contractor agrees that no claim shall be made for delays which are not called to the attention of the Engineer at the time of their occurrence.

2. Avoidable Delays: Avoidable delays in the prosecution of the work shall include delays which could have been avoided by the exercise of care, prudence, foresight and diligence on the part of the Contractor or his subcontractors. Avoidable delays include:

a. Delays which may in themselves be unavoidable but which affect only a portion of the work and do not necessarily prevent or delay the prosecution of other parts of the work nor the completion of the whole work within the contract time.

b. Time associated with the reasonable interference of other Contractors employed by the Owner which do not necessarily prevent the completion of the whole work within the contract time.

3. Unavoidable Delays: Unavoidable delays in the prosecution or completion of the work shall include delays which result from causes beyond the control of the Contractor and which could not have been avoided by the exercise of care, prudence, foresight and diligence on the part of the Contractor or his subcontractors. Delays in completion of the work of other Contractors employed by the Owner will be considered unavoidable delays insofar as they interfere with the Contractor's completion of the work. Delays due to normal weather conditions shall not be regarded as unavoidable as the Contractor agrees to plan his work with prudent allowances for interference by normal weather conditions. Delays caused by acts of God, fire, unusual storms, floods, tidal waves, earthquakes, strikes, labor disputes and freight embargoes shall be considered as unavoidable delays insofar as they prevent the Contractor from proceeding with at least 75 percent of the normal labor and equipment force for at least five hours per day toward completion of the current controlling items on the accepted construction schedule.

Should abnormal conditions prevent the work from beginning at the usual starting time, or prevent the Contractor from proceeding with 75 percent of the normal labor and equipment force for a period of at least five (5) hours per day, and the crew is dismissed as a result thereof, he will not be charged for the working day whether or not conditions change so that the major portion of the day could be considered to be suitable for work on the controlling item.

E. Extension of Time:

1. Avoidable Delays: In case the work is not completed in the time specified, including extensions of time as may have been granted for unavoidable delays, the Contractor will be assessed liquidated damages, as specified in Section 00 1500, Paragraph 86.

The Owner may grant an extension of time for avoidable delay if he deems it in his best interest. If the Owner grants an extension of time for avoidable delay, the Contractor agrees to pay the liquidated damages.

2. Unavoidable Delays: For delays which the Contractor considers to be unavoidable, he shall submit to the Engineer complete information demonstrating the effect of the delay on the controlling operation in his construction schedule. The submission shall be made within thirty (30) calendar days of the occurrence which is claimed to be responsible for the unavoidable delay. The Engineer shall review the Contractor's submission and determine the number of days of unavoidable delay and the effect of such unavoidable delay on controlling operations of the work. The Owner agrees to grant an extension of time to the extent that unavoidable delay affects controlling operations in the construction schedule. During such extension of time, neither extra compensation or engineering inspection and administration nor damages for delay will be charged by the Contractor to the Owner. It is understood and agreed by the Contractor and Owner that time extensions due to unavoidable delays will be granted only if such unavoidable delays involve controlling operations which would prevent completion of the whole work within the specified contract time. It is understood and agreed by the Contractor and Owner that during such extension of time, no extra compensation shall be paid to the Contractor.

3. DAMAGES FOR DELAYS: For the period of time that any portion of the work

remains unfinished after the time fixed for completion in the contract documents, as modified by extensions of time granted by the Owner, it is understood and agreed by the Contractor and the Owner that the Contractor shall pay the Owner the liquidated damages, specified in section 00 1500, Paragraph 86.

80 – Omissions

The drawings and specifications shall both be considered as a part of the contract. Any work and material shown in the one and omitted in the other, or described in the one and not in the other, or which may fairly be implied by both or either, shall be furnished and performed as though shown in both, in order to give a complete and first class job.

81 – Differing Site Conditions

a. The Contractor shall promptly, and before such conditions are disturbed, notify the Engineer in writing of: (1) subsurface or latent physical conditions differing materially from those indicated in this contract, or (2) unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract. The Engineer shall promptly investigate the conditions, and, if he finds that such conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performances of any part of the work under this contract, whether or not changed as a result of such conditions, an equitable adjustment shall be made and the contract modified in writing accordingly.

b. No claim of the Contractor under this clause shall be allowed unless the Contractor has given the required notice.

c. No claim by the Contractor for an equitable adjustment hereunder shall be allowed if asserted after final payment under this contract.

82 - Changes in Work

The Owner, without invalidating the Contract, may order additions to or deductions from the work. The Contractor shall proceed with the work, as changed and the value of any such extra work or change shall be determined as provided in the Agreement, and the contract sum adjusted accordingly. Any claim for extension of time caused thereby shall be adjusted at the time of ordering such change.

In giving instructions, the Engineer shall have authority to make minor changes in the work which does not involve extra cost and is consistent with the purpose of the work. Except in an emergency endangering life and property, no extra work or change shall be made unless in pursuance of a written order, and no claim for an addition to the Contract Sum shall be valid unless the additional work was so ordered.

a. Modification of Quantities: The itemized quantities shall be considered by the Contractor as the quantities required to complete the work for the purpose of bidding. Should actual quantities required in the construction of the work be greater or lesser than the quantities shown on the items, an amount equal to the difference

in quantities at the unit price bid for the items will be added to or deducted from the Contract Sum.

b. When itemized quantities are not given in the Proposal, the work shown on the plans or specifications shall be considered by the Contractor to be included in his contract for the lump sum prices bid.

83 - Force Account and Extra Work

If the Engineer orders, in writing, the performance of any work not covered by the plans or included in the specifications, and for which no unit price or lump sum basis can be agreed upon, then such extra work shall be done on a Cost-Plus-Percentage basis of payment as follows:

a. The Contractor shall be reimbursed for all costs incurred in doing the work, and shall receive an additional payment of 15% of all such cost to cover his overhead and profit for said work. In the event the Contractor has employed a subcontractor for this work, the total additional mark-up shall be 20%, 10% for the Main Contractor and 10% for the subcontractor. The total mark-up shall not exceed 20%. The City will not recognize subcontractors of subcontractors.

b. The term "Cost" shall cover all payroll charges for persons employed and supervision required under the specific Order, together with all workmen's compensation, Social Security, pension and retirement allowances and social insurance, or other regular payroll charges on same; the cost of all material and supplies required of either temporary or permanent character; rental of all power-driven equipment at the current Associated Equipment Distributors (AED) rate; and any other costs incurred by the Contractor as a direct result of executing the Order, if approved by the Engineer.

c. Except in an emergency endangering life and property, no extra work or change shall be made unless in pursuance of a written order, and no claim for an addition to the Contract Sum shall be valid unless the additional work was so ordered. The cost of the work shall be submitted to the Engineer along with the monthly pay request.

84 - Claims for Extra Cost

a. If the Contractor claims that any instructions by drawings or otherwise issued after the date of the Contract involved extra cost under the Contract, he shall give the Engineer written notice thereof within seven (7) days after the receipt of such instructions, and in any event before proceeding to execute the work, except in an emergency endangering life or property, and the procedure shall then be as provided for changes in the work. No such claim shall be valid unless so made.

b. Extra work not included in Article (a) but authorized after the date of the Contract that cannot be classified as coming under any of the Contract units may be done at mutually agreed upon unit price, or on a lump sum basis, or under the provision of Section 00 1500, Paragraph 83.

c. Extra costs which result from delays which cause an interruption in the orderly progress of the work as described in Section 00 1500, Paragraph 79 hereinbefore, will be considered under the following conditions.

(1) No claim will be considered for delays less than five (5) hours in duration.

(2) No claim will be considered in cases where the Contractor is able, without undue hardship, to shift his work crew to other productive work on the same project in the same general work area.

(3) The claim for extra cost due to delay shall be computed on a cost plus percentage basis as hereinafter specified under Paragraph 83.

(4) Unavoidable delays caused by weather as defined in Section 00 1500, Paragraph 79 (D) (3) shall be cause for extensions of time. However, damage to the Contractor caused by weather or an Act of God shall not be cause for additional compensation or monetary adjustment.

85 - Correction of Work Before Final Payment

The Contractor shall promptly remove from the premises all material condemned by the Engineer, or as determined by the Engineer as failing to meet Contract requirements, whether incorporated in the work or not, and the Contractor shall promptly replace and re-execute his own work in accordance with the Contract and without expense to the Owner and shall bear the expense of making all work of other Contractors destroyed or damaged by such removal or replacement.

If the Contractor does not remove such condemned work and materials as promptly as possible, after written notice, the Owner may remove them and store the material at the expense of the Contractor.

86 - Liquidated Damages

Failure to complete the work within the number of days stipulated in the Agreement, including extensions granted thereto, shall entitle the Owner to retain from compensation otherwise due to be paid to the Contractor, or otherwise recover by all remedies of law an amount equal to **$1,000.00** for each and every calendar day that the work is not complete.

It is agreed by and between the Owner and the Contractor that this sum has been established, not as a penalty but as liquidated damages and that it is reasonable and acceptable, as the City provides services necessary for the health and welfare of the public and due to the impracticability and extreme difficulty of fixing and ascertaining the actual damages sustained in such an event.

87 - Suspension of Work

The Owner may at any time suspend the work, or any part thereof by giving three (3) days' notice to the Contractor in writing. The work shall be resumed by the Contractor within ten (10) days after the date fixed in the written notice from the Owner to the

Contractor. The Owner shall reimburse the Contractor for expenses incurred by the Contractor in connection with the work under this Contract and adjust the date of completion as a result of such suspension. Nothing in this paragraph shall prevent the Owner from immediate suspension of the Contractor's work where, in the Engineer's opinion, the health or welfare of the public are at risk.

88 - Termination of Contract

A. TERMINATION FOR CONVENIENCE OF OWNER

The Owner may, at any time upon ten (10) days written notice to the Contractor, terminate (without prejudice to any right or remedy of the Owner) the whole or any portion of the Work for the convenience of the Owner.

The Contractor, in calculating his termination application for payment, shall develop his outstanding costs in accordance with Section 00 1500, Paragraph 83, including those materials in transit and uncancellable with the appropriate percentage markups; subcontractors shall follow same procedures. All costs must be substantiated by adequate back-up documentation.

B. DEFAULT TERMINATION

The Owner may upon ten (10) days written notice to the Contractor, terminate (without prejudice to any right or remedy of Owner) the whole or any portion of the Work required by the contract Documents in any one of the following circumstances:

1. If the Contractor refuses or fails to prosecute the Work, or any separable part thereof, with such diligence as will ensure the Substantial Completion of the Work within the Contract time;

2. If the Contractor is in material default in carrying out any provisions of this Contract for a cause within its control;

3. If the Contractor files a voluntary petition in bankruptcy or a petition seeking or acquiescing in any reorganization, arrangement, composition, readjustment, liquidation, dissolution or similar relief for itself under any present or future federal, state or other statute, law or regulation relating to bankruptcy, insolvency or other relief for debtors;

4. If a trustee, receiver or liquidator is appointed for the Contractor or for all or any substantial part of the property of the Contractor; or if the Contractor makes a general assignment for the benefit of creditors or admits in writing its inability to pay its debts generally as they become due;

5. If the Contractor has filed against it a petition in bankruptcy under any present or future federal or state statute, law or regulation relating to bankruptcy, insolvency or other relief for debtors and the same is not discharged on or before forty-five (45) days after the date of the filing thereof; or if the Contractor is adjudged a bankrupt;

6. If the Contractor is adjudged a bankrupt, makes a general assignment for the

benefit of its creditors, or if a receiver is appointed on account of its insolvency;

7. If the Contractor fails to supply a sufficient number of properly skilled workmen or proper materials;

8. If the Contractor fails to make prompt payment to subcontractors for materials or labor, unless Contractor otherwise provides Owner satisfactory evidence that payment is not legally due;

9. If the Contractor persistently disregards laws, ordinances, rules, or regulations or order of any public authority having jurisdiction;

10. If the Contractor substantially violates any provision of the Contract Documents; or

If, after Contractor has been terminated for default pursuant to Paragraph B, it is determined that none of the circumstances set forth in Paragraph B exist, then such termination shall be considered a termination of convenience pursuant to Paragraph A.

If Owner terminates this agreement for any of the reasons enumerated in Paragraph B, then the Owner may take possession of the site and of all materials, equipment, tools, construction equipment and machinery thereon owned by the Contractor and may finish the work by whatever method he may deem expedient. In such case, the Contractor shall not be entitled to receive any further payment until the work is finished.

C. ALLOWABLE TERMINATION COSTS

If the Owner terminates the whole or any portion of the Work pursuant to Paragraph A, then the Owner shall only be liable to Contractor for those costs reimbursable to Contractor in accordance with Paragraph D, plus the cost of settling and paying claims arising out of the termination of Work under subcontracts or orders, pursuant to Paragraph D, which are properly chargeable to the terminated portion of the Contract (exclusive of amounts paid or payable on account of completed items of equipment delivered or services furnished by subcontractors or vendors prior to the effective date of the Notice of Termination), which amounts shall be included in the costs payable under (1) above, and the reasonable costs of settlement, including accounting, legal, clerical and other expenses reasonably necessary for the preparation of settlement claims and supporting data with respect to the terminated portion of the Contract, together with reasonable storage, transportation and other costs incurred in connection with the protection of disposition of property allocable to this contract.

Provided, however, that if there is evidence that the Contractor would have sustained a loss on the entire Contract had it been completed, no profit shall be included or allowed hereunder and an appropriate adjustment shall be made reducing the amount of the settlement to reflect the indicated rate of loss.

The total sum to be paid to the Contractor under this Paragraph C shall not exceed

the Contract sum as reduced by the amount of payments otherwise paid, by the Contract price of Work not terminated and as otherwise permitted by this Contract. Except for normal spoilage, and except to the extent that the Owner shall have otherwise expressly assumed the risk of loss, there shall be excluded from the amounts payable to the Contractor, as provided in this Paragraph C, the fair value, as determined by the Engineer, of property which is destroyed, lost, stolen or damaged so as to become undeliverable to the Owner.

D. GENERAL TERMINATION PROVISIONS

After receipt of a Notice of Termination from the Owner, pursuant to Paragraph A or B, and except as otherwise directed by the Engineer, the Contractor shall:

1. Stop Work under the Contract on the date and to the extent specified in the Notice of Termination;

2. Place no further orders or subcontracts for materials, services or facilities, except as may be necessary to complete the portion of the Work under the Contract as is not terminated;

3. Terminate all orders and subcontracts to the extent that they relate to the performance of Work terminated by the Notice of Termination;

4. Assign to the Owner in the manner, at the times and to the extent directed by the Engineer, all of the right, title and interest of the Contractor under the orders and subcontracts so terminated, in which case the Owner shall have the right, in its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts;

5. Settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts, with the approval or ratification considered final for all the purposes of this clause;

6. Transfer title and deliver to the entity or entities designed by the Owner, in the manner, at the times and to the extent, if any, directed by the Engineer, and to the extent specifically produced or specifically acquired by the Contractor for the performance of such portion of the work as had been terminated;

a. The fabricated or unfabricated parts, work in process, partially completed supplies and equipment, materials, parts, tools, dies, jigs and other fixtures, completed Work, supplies and other material produced as part of, or acquired in connection with the performance of the Work terminated by the Notice of Termination, and

b. The completed or partially completed plans, drawings, information, and other property related to the Work;

7. Use his best efforts to sell, in the manner, at the times, to the extent and at the price or prices directed or authorized by the Engineer, and property of the types

referred to in Paragraph D; provided, however, that the Contractor:

a. Shall not be required to extend credit to any buyer, and

b. May acquire any such property under the conditions prescribed by and at a price or prices approved by the Engineer; and provided further that the proceeds of any such transfer or disposition shall be applied in reduction of any payments to be made by the Owner to the Contractor under this Contract or shall otherwise be credited to the price or cost of the Work covered by this Contract or paid in such other manner as the Engineer may direct;

8. Complete performance of such part of the work as shall not have been terminated by the Notice of Termination; and

9. Take such action as may be necessary, or as the Engineer may direct, for the protection and preservation of the property related to this Contract which is in the possession of the Contractor and in which the Owner has or may acquire an interest.

a. The Contractor shall, from the effective Date of Termination until the expiration of three (3) years after Final Settlement under this contract, preserve and make available to the Owner, at all reasonable times at the office of the Contractor, but without direct charge to the Owner, all its books, records, documents, and other evidence bearing on the costs and expenses of the Contractor under this Contract and relating to the Work terminated hereunder, or, to the extent approved by the Engineer, photographs, microphotographs or other authentic reproductions thereof.

In arriving at any amount due the Contractor pursuant to Paragraph C, there shall be deducted:

b. All unliquidated advance or other payments on account theretofore made to the Contractor applicable to the terminated portion of this Contract;

c. Any claim which the Owner may have against the Contractor;

d. Such claim as the Engineer determines to be necessary to protect the Owner against loss because of outstanding or potential liens or claims; and

e. The agreed price for, or the proceeds of sale of, any materials, supplies, or other things acquired by the Contractor or sold, pursuant to the provisions of Paragraph D, and not otherwise recovered by or credited to the Owner. Contractor shall refund to the Owner any amounts paid by the Owner to Contractor in excess of costs reimbursable under Paragraph C.

The Owner, at its option and Contractor's expense, may have costs reimbursable under Paragraph C audited and certified by independent certified public accountants selected by the Owner.

89 – Contractor's Right to Stop Work or Terminate Contract

If the Work should be stopped under an order of any court for a period of three (3) months, through no fault of the Contractor or of anyone employed by him, then the Contractor may, upon seven (7) days written notice to the Owner and the Engineer, stop work or terminate this Contract and recover from the Owner payment for all work executed, plus any loss sustained upon any plant or materials, plus reasonable profit and damages, as defined in Section 00 1500, Paragraph 83 (a).

90 - Settlement Upon Termination of Contract

Upon termination of this Contract in accordance with Section 00 1500, Paragraph 88 or Section 00 1500, Paragraph 89 settlement shall be computed on the basis prescribed in Section 00 1500, Paragraph 83 (a).

91 - Removal of Equipment

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

92 - Laws of Georgia

This contract shall be governed by the Laws of the State of Georgia.

93 - Discrepancy between General Conditions and Technical Specifications

Should there be a discrepancy between the General Conditions and Technical Specifications, the Technical Specifications shall govern.

94 - Debarment and Suspension

Contractors or their principals who are debarred, suspended, proposed for debarment, declared ineligible or voluntary excluded by any Federal department or agency pursuant to the regulations implementing Executive Order 12549,29 CFR Part 98, Section 98.510 shall be precluded from bidding on all City work for the period of their debarment.

SECTION 00 1600

SUPPLEMENTAL GENERAL CONDITIONS

1. THE GENERAL CONDITIONS:

The General Conditions shall apply to all work in this Contract, except as otherwise specified in the Supplemental General Conditions. Requirements of the Supplemental General Conditions supersede those of the General Conditions.

2. DIFFERING SITE CONDITIONS:

The Contractor shall promptly, and before such conditions are disturbed, notify the Engineer in writing of: 1) subsurface or latent physical conditions differing materially from those indicated in the Contract, or 2) unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract. The Engineer shall promptly investigate the conditions. If such conditions materially differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performance of any part of the work under this Contract, whether or not changed as a result of such conditions, an equitable adjustment shall be made, and the Contract modified in writing accordingly.

3. ADJUSTMENT OF DISCREPANCIES:

In all cases of discrepancies between the various dimensions and details shown on drawings, or between the drawings and these specifications, the more expensive construction shall be estimated before work is started. The matter shall be submitted to the Engineer for clarification. Without such a decision, discrepancies shall be adjusted by the Contractor, who shall bear all of the extra expense involved.

4. The Contractor shall take all necessary precautions to protect existing structures, curbs, sidewalks, etc. from damage due to heavy construction traffic or equipment. The Contractor shall repair all items damaged during the construction at no additional cost to the Owner.

5. The Contractor shall protect freshly placed concrete from vandalism or other damage.

6. Items that are to be reset (i.e., sidewalks, steps, fence, etc.) shall be done so using original patterns and materials only. In the event of breakage of materials, only materials accepted in writing by the Engineer/Owner may be used by the Contractor as replacements. The cost of replacement materials shall be paid for by the Contractor.

7. All new manholes shall be pre–cast concrete as shown on detail sheet.

8. Should any damage to existing trees, shrubs, etc., that are called to be replanted on the plans, occur in the opinion of the Owner, the Contractor shall either repair the damage (if possible) or provide new trees, shrubs, etc., of the same type at no additional cost to the Owner.

9. The cost to remove all trees, regardless of size (including stump), shall be included in the contract lump sum price.

10. The Contractor shall comply with all local, state, and federal regulations as they pertain to construction activities (erosion control, etc.)

11. The Contractor shall provide a project manager acceptable to the Owner for the duration of the work of this project. The Contractor shall not replace the project manager without approval of the owner's

representative. The Contractor shall provide a superintendent acceptable to the Owner for the duration of the work of this project. The Contractor shall not replace the superintendent without the approval of the owner's representative. In the case that either representative's employment is terminated with the contractor, replacements credentials should be submitted. Neither representative may be integrated into the actual workforce in a task completion role. The costs associated with the above shall be included in the overall project cost.

12. The Owner reserves the right to switch from seed to sod where a sufficient stand of grass, per the specifications, cannot be obtained.

13. Insure that existing water main/laterals are not damaged during construction. Any damage must be repaired and paid for by the Contractor.

14. **Record Data and Drawings:** The Contractor shall keep accurate, legible records of the locations, types, and sizes of sanitary lines, service laterals, manholes, cleanouts, force mains, water lines, fittings, valves, hydrants, drainage pipes, drainage structures, and other related work performed under this project. On a set of project prints provided by the Owner, the Contractor shall prepare a set of "as–built" drawings for the data stated above. Invert elevations of all manholes, storm sewers and structures, sanitary sewers and lift stations shall be clearly indicated. These "as–built" drawings shall be kept clean and dry and maintained in a current state with the progress of the work. Updated "as–built" drawings shall be submitted at least monthly with payment request or as determined necessary with the progress of work.

    Before final acceptance of the completed installation and before final payment by the Owner, the Contractor shall deliver to the Engineer, four (4) sets of "Record Survey" Drawings accurately depicting the horizontal and vertical as–built data described above. "Record Survey" drawings for the items installed on this project shall be certified by a licensed engineer or surveyor, registered in the State of Georgia. The size of the drawings shall be 24" x 36". The "Record Survey" drawings shall have a coordinate system based on the Georgia State Plane Coordinate System, East Zone, North American Datum of 1983 (NAD83). Elevations shall be based on the North American Vertical Datum of 1988 (NAVD 88). All measurements and coordinates shown shall use the U.S. Survey definition.

    Coordinates shall be shown on all drainage structures, sanitary sewer manholes, storm manholes/boxes, valve boxes/vaults, valve manholes, valves, fire hydrants, fittings, and all other related work performed under this contract. Vertical data including but not limited to, structure and manhole frame and inverts, pipe inverts, valve manhole frames, lift station frame, inverts, control levels, and bottom, site grading, and as–built grading shall be shown. In addition to the "Record" drawings, Contractor shall deliver to Engineer electronic AutoCAD (v. 14 or later) files of all the data described above on a CD–ROM.

15. **Geotechnical Evaluation Reports:** Geotechnical evaluation reports are provided as Exhibit "A" to this section (attached). <u>These reports are provided for reference only to aid in the bidding of the project</u>. Contractor is responsible for verifying soil conditions, characteristics, geotechnical parameters, and foundation requirements with any additional site inspections, testing, or study necessary.

    The Contractor is responsible for complying with all site preparations, surcharge/pre–loading, pipe/utility installation, structural fill, trenching, embankment, and details of construction recommendations as presented in the Geotechnical Evaluation Reports by Terracon Consultants, Inc. included in Section 001600 – Supplemental General Conditions. The geotechnical reports are furnished to the Contractor to assist in the foundation design, site preparation, pipe bedding design, embankment, and surcharge requirements, and may or may not represent all field conditions. Additional testing required for verifying site condition, settlement monitoring, and surcharge design shall be done at the Contractor's expense.

16. **Examinations of Plans, Specifications, and Supplemental General Conditions:** The Bidder is expected to examine carefully the site of the proposed work, the Proposals, Plans, Specifications, Supplemental Specifications, Supplemental General Conditions, and Contract forms before submitting a bid. The submission of a bid shall be considered prima facie evidence that the Bidder has made such examination and is satisfied as to the conditions to be encountered in performing The Work and as to requirements of the Plans, Specifications, Supplemental Specifications, Supplemental General Conditions, and Contract.

    It is the obligation of the Bidders to make their own interpretation of all subsurface data that may be available as to the nature and extent of the materials to be excavated, graded, compacted, as well as requirements for surcharging, pipe laying, pile driving, and all other aspects of the construction. Such information, if available and furnished to the Bidders by the Owner, does not in any way guarantee the amount or nature of the material which may be encountered.

17. **Interpretation of Estimates:** Although the entire project is a lump sum price, there are some items with the quantities of work to be performed and materials to be furnished to complete the construction of The Work as shown on the Plans and contained in the Proposal are approximate and are to be used for comparing Bids. The Owner does not guarantee that the quantities indicated on the Plans or given in the Proposal will be the actual construction quantities. The Contractor shall not plead deception or misunderstanding because of variation from these quantities or minor variations from the locations, or character of the Work. Payment to the Contractor will be made only for the actual quantities of work performed in accordance with the Plans and Specifications. Upon completion of construction, if the actual quantities are more or less than the quantities given in the Proposal, the Unit Prices Bid in the Proposal will still prevail, except as otherwise provided in the General Conditions.

18. **Contractor** shall coordinate all construction activities with City of Savannah, Chatham County, ANG, Georgia Power, and any other utility owners within the project area. Any and all approval and permits for work in these areas, which have not been included with these Contract Documents, shall be the responsibility of the Contractor. There will be no separate measurement or payment for cost or fees associated with coordination with or for obtaining approvals from these parties. These costs shall be considered a subsidiary obligation of the Contract.

19. **Contractor** shall coordinate all construction activities with Georgia Power prior to commencing work. Contractor will verify all power relocations required have been completed prior to starting work and will comply with all Georgia Power safety requirements for working in proximity to power lines.

20. **Contractor** shall be responsible for supporting existing sewer structures and pump station during the connection process. Contractor shall submit a support and protection plan to City/Engineer detailing how existing structures will be supported during excavation, connection, and backfilling operations. No separate measurement or payment will be made for protection of existing structure or for preparation of support/protection plan. These costs shall be considered a subsidiary obligation of the contract.

21. **Contractor** shall coordinate all construction including traffic control, roadway closures and detours with the City of Savannah and ANG. Any and all approval and permits for work in the roadway shall be the responsibility of the Contractor. Contractor shall also be responsible for providing all traffic marking/striping on the roadway surface in accordance with City, and ANG requirements. All costs associated with the traffic control, roadway closures and detours shall be included in the contract lump sum bid price.

22. **Water Distribution System Specifications:** The following items shall be modified, as indicated, in the City of Savannah Standard Specification Section 02550 – "Water Distribution System."

Part 1.01 Pipe

- Add the following paragraph to Paragraph A. Ductile Iron Pipe:

  1. 48–inch pipe shall be ductile iron pressure class 350 restrained joint pipe and shall conform to ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53.

- Add the following paragraphs to Paragraph B. PVC Pipe

1. PVC Pipe – AWWA C–900 – shall be in sizes between 4 inches and 12inches shall meet the requirements of AWWA C900 "Poly Vinyl Chloride (PVC) Pressure Pipe" and shall conform to all the requirements of ASTM D1784 and ASTM D2241. The pipe shall be a minimum of DR 18 and shall be capable of withstanding the overburden pressures determined by the depth of burial in the field.

   Pipe material shall be made from clean, virgin, NSF approved Class 12454–A PVC compound conforming to resin specification ASTM D1784. Standard laying lengths shall be 20–feet (±1 inch). Random lengths of not more than 15% of the total footage of each size may be shipped in lieu of the standard lengths. Reruns of reclaimed material shall not be accepted.

   The pipe shall have bell and spigot ends with push–on, compression type joints. Elastomeric gaskets shall conform to the requirements of ASTM D3139 and ASTM F477.

   Minimum pipe stiffness (F/dY) at 5% deflection shall be 914 psi for all sizes when tested in accordance with ASTM D2241.

   The pipe shall be designed to pass a quick burst test pressure of 985 psi applied in 60 to 70 seconds when tested in accordance with ASTM D1599, as referenced in ASTM D2241.

   Fittings for C900–Class 200, DR 18 shall be ductile iron, bolted mechanical joint.

2. PVC Pipe – AWWA C–900 shall be used for sizes 16" and greater and shall meet the requirements of AWWA C900 "Poly Vinyl Chlorine (PVC) Pressure Pipe and Fabricated Fittings, 14 in. through 48 in." and shall conform to all the requirements of ASTM D1784 and ASTM D2241. The pipe shall be a minimum of DR 18 and shall be capable of withstanding the overburden pressures determined by the depth of burial in the field.

   Pipe material shall be made from clean, virgin, NSF approved Class 12454–A PVC compound conforming to resin specification ASTM D1784. Standard laying lengths shall be 20–feet (±1 inch). Random lengths of not more than 15% of the total footage of each size may be shipped in lieu of the standard lengths. Reruns of reclaimed material shall not be accepted.

   The pipe shall have bell and spigot ends with push–on, O–ring rubber gasket, compression type joints. Elastomeric gaskets shall conform to the requirements of ASTM D3139 and ASTM F477.

   Minimum pipe stiffness (F/dY) at 5% deflection shall be 435 psi for all sizes when tested in accordance with ASTM D2241.

   The pipe shall be designed to pass a quick burst test pressure of 755 psi applied in 60 to 70 seconds when tested in accordance with ASTM D1599, as referenced in ASTM D2241.

Fittings for C900–Class 200, DR 18 shall be ductile iron, bolted mechanical joint.

Part 1.09 Gate Valves

- Add the following paragraph:

1. 16–inch gate valve shall be utilized in lieu of 16–inch butterfly valves where directed by the City and Engineer. 16–inch and larger gate valves shall be installed in a minimum 6–foot diameter manhole with appropriate vertical clearance to allow for operation of the nut. Manhole shall conform to the construction drawing detail shown on plans for 10–inch and 12–inch gate valve manholes, with appropriate clearances of manhole bottom, walls, and upper slab.

k. Valve manholes 6–foot and larger in diameter shall be precast reinforced concrete sections. Conforming to the following specifications:
The product design, performance, materials, manufacture, handling, and installation shall conform to the following references and the project specifications:

ACI 318 – Building Code Requirements for Reinforced Concrete

ASTM C 39 – Compressive Strength of Cylindrical Concrete Specimens

ASTM C – 478 – Precast Reinforced Concrete Manhole Sections

ASTM C 890 – Minimal Structural Design Loading for Precast Concrete Water and Wastewater Structures

ASTM C 891 – Installation of Underground Precast Concrete Utility Structures

ASTM C 913 – Precast Concrete Water and Wastewater Structures

The Contractor or supplier shall provide for the design of the precast structure. Each section of the structure shall be designed and manufactured for its individual depth, loading conditions (lateral, surcharge and hydrostatic), and opening requirements. All concrete in the precast structure shall have a minimum compressive strength of 4,000 psi after 28 days. Reinforcing steel shall comply with ASTM A 615 Grade 60 (min. fy = 60,000 psi). Bar bending, and placement shall comply with the ACI latest standards.

The precast structure manufacturer shall have the necessary equipment and facilities for the proper manufacture of the sections and to perform compressive strength tests on concrete tests specimens. Test cylinders shall be made for each structure and test conducted in accordance with ASTM C 39, except the compressive strength shall be equal to or greater than the design of the concrete. Structure design computations, concrete mix design, and test reports certifying design strength has been achieved at the 28–day break shall be submitted to the Engineer. Design of the structure shall be performed by a Registered Professional Engineer at the Contractor's expense. The design parameters for the precast structure shall include:

Lateral load based on a water table at the surface using equivalent fluid pressure of 80 pcf from the surface grade down and a vehicle wheel load designation of HS20–44. Design live load for the top slab shall be for a vehicle wheel load designation of HS20–44. The precast concrete sections shall have a minimum wall thickness of 12–inches for 12–foot diameter manholes, 11–inches for 10–ft diameter manholes, 9–inches for 8–ft diameter manholes, and 8–inches for 6–ft diameter manholes. The minimum top slab thicknesses shall be 6–inches for all valve manholes. The minimum bottom slab thickness shall be 8–inches. Actual

thicknesses greater than minimum shall be as required by the loading conditions based on precast manufacturers design.

The structure manufacturer shall prepare and submit six (6) sets of shop drawings showing wall and slab thicknesses, structural reinforcing, and opening locations. The manufacturer shall also provide the design analyses and calculations to show all sections have been designed for the burial depths shown on the construction drawings as well as stresses incurred during transport, handling, and installation. Calculations and analyses must be performed and sealed by a Licensed Professional Engineer and submitted for review. All shop drawings and design calculations shall be submitted to the Contractor for review. Contractor shall forward these documents to the Engineer. Such documents shall bear the stamp or written statement of the Contractor indicating Contractor's review for completeness and receipt. Contractor shall be responsible for the accuracy of the shop drawings and for their conformity to the plans and specifications. Shop drawings with insufficient or incomplete data required to indicate compliance with these specifications are not acceptable and will be returned to the Contractor. Rejected shop drawings shall not relieve the Contractor from his completing the project within the time allowed by the Contract Documents.

Part 1.03 Fittings

- Add the following paragraph:

  All fittings and all joints shall be restrained on all proposed water and sewer force mains.

Part 1.10 Butterfly Valves

- Add the following paragraph:

  l. Manholes for butterfly valves shall be precast reinforced concrete sections as shown on the plans.

  The product design, performance, materials, manufacture, handling, and installation shall conform to the following references and the project specifications:

  ACI 318 – Building Code Requirements for Reinforced Concrete

  ASTM C 39 – Compressive Strength of Cylindrical Concrete Specimens

  ASTM C – 478 – Precast Reinforced Concrete Manhole Sections

  ASTM C 890 – Minimal Structural Design Loading for Precast Concrete Water and Wastewater Structures

  ASTM C 891 – Installation of Underground Precast Concrete Utility Structures

  ASTM C 913 – Precast Concrete Water and Wastewater Structures

  The Contractor or supplier shall provide for the design of the precast structure. Each section of the structure shall be designed and manufactured for its individual depth, loading conditions (lateral, surcharge and hydrostatic), and opening requirements. All concrete in the precast structure shall have a minimum compressive strength of 4,000 psi after 28 days. Reinforcing steel shall comply with ASTM A 615 Grade 60 (min. fy = 60,000 psi). Bar bending, and placement shall comply with the ACI latest standards.

  The precast structure manufacturer shall have the necessary equipment and facilities for the proper manufacture of the sections and to perform compressive strength tests on concrete

tests specimens. Test cylinders shall be made for each structure and test conducted in accordance with ASTM C 39, except the compressive strength shall be equal to or greater than the design of the concrete. Structure design computations, concrete mix design, and test reports certifying design strength has been achieved at the 28–day break shall be submitted to the Engineer. Design of the structure shall be performed by a Registered Professional Engineer at the Contractor's expense. The design parameters for the precast structure shall include:

Lateral load based on a water table at the surface using equivalent fluid pressure of 80 pcf from the surface grade down and a vehicle wheel load designation of HS20–44. Design live load for the top slab shall be for a vehicle wheel load designation of HS20–44. The precast concrete sections shall have a minimum wall thickness of 12–inches for 12–foot diameter manholes. The minimum top slab thicknesses shall be 12–inches for all wet wells. The minimum bottom slab thickness shall be 12–inches. Actual thicknesses greater than minimum shall be as required by the loading conditions based on precast manufacturers design.

The structure manufacturer shall prepare and submit six (6) sets of shop drawings showing wall and slab thicknesses, structural reinforcing, and opening locations. The manufacturer shall also provide the design analyses and calculations to show all sections have been designed for the burial depths shown on the construction drawings as well as stresses incurred during transport, handling, and installation. Calculations and analyses must be performed and sealed by a Licensed Professional Engineer and submitted for review. All shop drawings and design calculations shall be submitted to the Contractor for review. Contractor shall forward these documents to the Engineer. Such documents shall bear the stamp or written statement of the Contractor indicating Contractor's review for completeness and receipt. Contractor shall be responsible for the accuracy of the shop drawings and for their conformity to the plans and specifications. Shop drawings with insufficient or incomplete data required to indicate compliance with these specifications are not acceptable and will be returned to the Contractor. Rejected shop drawings shall not relieve the Contractor from his completing the project within the time allowed by the Contract Documents.

23. **Wastewater Collection System Specifications:** The following shall be modified, as indicated, in the City of Savannah Standard Specification Section 02554 – "Wastewater Collection System"

Part 1.01 Sewer Pipe, A. Gravity Sewer

1. Add the following paragraphs to existing Paragraph 1. "PVC Pipe":

A. Polyvinyl Chloride (PVC) Pipe (8" – 12") Gravity Sewer Pipe
Polyvinyl chloride (PVC) pipe and fittings shall conform to the requirements of ASTM D3034 with a maximum SDR of 26. Joints shall conform to the requirements of ASTM D3212. Reruns of reclaimed materials shall not be accepted. The pipe shall have bell and spigot ends with push–on, compression type joints. Elastomeric gaskets shall conform to the requirements of ASTM F477. Minimum cell class shall be 12454B. PVC shall be supplied in 13-foot lengths. **ALL PVC PIPE SHALL BE STORED OUT OF THE SUNLIGHT OR APPROPRIATELY COVERED WITH A UV RESISTANT COVER. ALL PVC PIPE SHALL BE PROPERLY SUPPORTED SO "SAGGING" OF THE PIPE DOESN'T OCCUR DURING STORAGE. ANY PVC PIPE SHOWING UV DEGRADATION OR SAGGING SHALL BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE.**

B. Polyvinyl Chloride (PVC) Pipe (15" – 36") Gravity Sewer Pipe
Polyvinyl chloride (PVC) pipe and fittings shall conform to the requirements of ASTM D2241 and AWWA C900 with a minimum DR of 18. Joints shall conform to the requirements of ASTM D3212. Reruns of reclaimed materials shall not be accepted. The pipe shall have bell and spigot ends with push–on, compression type joints. Elastomeric gaskets shall conform

to the requirements of ASTM F477. Minimum cell class shall be 12454B. **ALL PVC PIPE SHALL BE STORED OUT OF THE SUNLIGHT OR APPROPRIATELY COVERED WITH A UV RESISTANT COVER. ALL PVC PIPE SHALL BE PROPERLY SUPPORTED SO "SAGGING" OF THE PIPE DOESN'T OCCUR DURING STORAGE. ANY PVC PIPE SHOWING UV DEGRADATION OR SAGGING SHALL BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE.**

Part 1.02 Sewer Pipe Joints

- Add the following paragraph:

  All fittings and all joints shall be restrained on all proposed force mains.

Part 1.05 Casing and Casing Spacers

- Add the following paragraph:

  Design and installation of casings and pipelines crossing CSX Railroads shall be performed in accordance with "CSX Transportation Design & Construction Standard Specifications – Pipeline Occupancies," latest revision. Casings and pipelines crossing Norfolk Southern railroads shall be designed and constructed in accordance with "Specifications for Pipeline Occupancy of Norfolk Southern Property," latest revision. At a minimum 36–inch steel casings will have a wall thickness of 0.532–inches, 30–inch steel casings shall have a minimum wall thickness of 0.500–inches, and all casings 24–inch and smaller shall have a minimum wall thickness of 0.375–inch, unless thicker walls are required by the design and specifications manuals listed in this section.

24. All roadway and storm drainage system construction shall be in accordance with the Georgia Department of Transportation (GDOT) Standard Specifications for Construction of Transportation Systems (2013 Edition), except noted and amended elsewhere herein.

25. Televising of storm lines shall be conducted a minimum of 30 days following installation. Televising may be conducted by the Contractor or his sub at no additional cost to the City. The scheduling of the televising, regardless of televising source (City provided or private contractor), is the responsibility of the Contractor.

26. The following is agreed to as a condition of this project, and the costs associated with same shall be included in the overall project cost. The Contractor shall provide a superintendent acceptable to the Owner for the duration of the work of this project. The Contractor shall not replace the superintendent without acceptance of the owner's representative. The Contractor shall provide a construction quality control/quality assurance representative acceptable to the Owner for the duration of the work of this project. The Contractor shall not replace the quality control/quality assurance representative without the acceptance of the owner's representative. In the case that either representative's employment is terminated with the contractor, replacements credentials should be submitted. Neither representative may be integrated into the actual workforce in a task completion role.

27. The contractor shall pay particular attention to the need for proper shoring and bracing of excavation for construction of utility lines and structures. The contractor shall note that no separate payment shall be made for sheet piling, shoring, and bracing of excavations. Contractor shall incorporate any such costs into bid price for the item to which it pertains. Any damages that occur due to the installation of sheeting for any other type of excavation bracing shall be the responsibility of the contractor.

28. Adjustment of manhole to grade shall be done with brick and mortar, not exceeding 12–inches in height.

29. All efforts have been made to identify underground and above–ground utilities; however, the contractor has the ultimate obligation to proceed with caution when a suspected utility line is present in the excavation. Any lines, which are not shown to be abandoned, shall be repaired immediately if broken during construction at the Contractor's expense. All service laterals shall remain in service and contractor must keep each service in operation during construction. The contractor shall be responsible for furnishing all necessary materials for temporary bypassing of any utilities as needed. Prior to performing any by–pass operation, the contractor shall submit his proposed method of bypassing and/or hydro stopping. Bypassing or hydro–stopping shall be included in the bid price. Temporary relocation of electric, gas, or cable utilities will be coordinated by the contractor with the respective utility provider to maintain continuous service, at no additional cost to the city.

30. Construction Site Safety: Contractor shall comply with paragraphs 55 and 56 in Section 001500 of the General Conditions in regard to Site Safety. During construction of the project, the contractor shall provide and maintain all necessary safety measures adequate to prevent unauthorized entry to the construction area. The contractor shall be held liable for any injuries to a member of the public due to insufficient safety measures. The contractor, upon request of the construction inspector, shall provide safe access to the work for adequate inspection at no additional cost to the City, as per Section 001500, paragraph 15–G of the General Conditions.

31. Beside ANG property noted in Section 01 30 00, no addition property is currently owned and available for the contractor's use as a laydown area, materials storage, or secure storage area. Property lines shown on the project drawings depict the public right–of–way, utilized for the project design. It is the Contractor's responsibility to locate, obtain entry, and maintain property to be used in construction of the project. Any costs related to those properties utilized by the contractor shall be included in the contract lump sum price for "Mobilization." No separate measurement or payment shall be made for any cost related to use of property outside the project rights–of–way.

32. Construction Schedules: In accordance with General Conditions Section 001500, paragraph 46, the Contractor shall submit an updated schedule and sequence of operation for completing the work with each pay request or at the request of the Engineer or Owner. As a minimum, the schedule shall include the following:

a. Start/finish duration all activities
b. Identification of all activities along the critical path
c. Identification of all activities that involve the Owner
d. Narrative explaining construction sequencing
e. Name of person who prepared schedule
f. Identification of all activities over 30 days.
g. Date Prepared

33. Shop Drawing/Product Submittals: The contractor is required to provide the following generally described shop drawing submittals that will be required for the project:

a. All items listed in Section 01 33 00 "Submittal Procedures" Water system–Piping, fittings, restraints, valves manhole structures, sealant, rings and covers, stoppels, hydrants, tracer wire, marker tape, valve boxes, casings for crossings, coatings for ferrous materials;
b. Sanitary sewer system – Piping, fittings, manhole structures, sealant, rings and covers, stoppels for force main connection, casings for crossings, coatings for ferrous materials, tracer wire and marker tape;
c. Control and auxiliary Building – masonry, roof sheathing, doors, louvers, door hardware, bricks, color selection charts, gutters, downspouts, flow meter equipment, control valve assemblies, electrical/control equipment, lighting, concrete mix design, fittings, and all other appurtenances and equipment.
d. Any other items that are not listed but are outlined in the plans and specifications or as requested by the Engineer or Owner.

34. Warranty Period:

The Owner is requiring the Contractor to guarantee all work for twelve (12) months from the date of Final Acceptance pursuant to Section 001500, General Conditions. In addition, the following shall supplement the requirements of the warranty period as specified in Section 001500.

A. The intent and purpose of the warranty period is as follows:

1.) To have the Contractor guarantee the work against all defects arising from workmanship or materials for a period of twelve (12) months from the date of Final Acceptance.

2.) To have the Contractor remedy, at his own expense and without additional cost to the Owner, rebuild, repair, restore, correct, and make good work that may become non–conforming during the warranty period.

3.) To have a functionally complete project conforming to the Contract Documents at the end of the twelve (12) month Warranty Period.

35. DEFECTIVE

The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

a. Does not conform to the Contract Documents; or
b. Does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
c. Has been damaged prior to Engineer's recommendation of final payment

36. DUCTILE IRON SANITARY SEWER AND WATER PIPING

a. Ductile iron sanitary sewer and water piping shall be pressure class 350, unless otherwise specifically noted in the plans.

37. WATER AND SEWER CONTRACTOR/SUBCONTRACTOR QUALIFICATIONS

a. Contractor shall provide written documentation and certifications indicating that the Contractor and any subcontractors performing proposed water and sewer relocations and improvement work are experienced. Contractor shall provide written documentation of its, or if work is to be subcontracted, the subcontractor's past similar projects performed himself and any involving water mains 16–inch and larger, force mains 16–inch and larger, and sanitary sewers 24–inch and larger. The Contractor or water and sewer subcontractor(s) must demonstrate experience with at least four (4) successful projects in the last fifteen (15) years of similar size and complexity.

38. Any and all work, labor, equipment, materials, design, and other incidental required to provide and maintain temporary drainage, traffic flow, water/sewer utility service, other utility service, earthwork, by-passing, and all other temporary work shall not be measured or paid for separately. All cost for all temporary work shall be considered a subsidiary obligation to the contract.

INDEX TO

SECTION 00 1700 – MEASUREMENT AND PAYMENT

SECTION 00 1700

MEASUREMENT AND PAYMENT

PART 1 – MEASUREMENT

1.1 MEASUREMENT

The items listed in the proposal shall be considered as sufficient to complete the work in accordance with the plans and specifications. Any portion of the work not listed in the bid form shall be deemed to be a part of the item that it is associated with and shall be included in the cost of the unit shown on the bid form. Payment for the unit shown on the bid form shall be considered to cover the cost of all labor, material, equipment and performing all operations necessary to complete the work in place. The unit of measurement shall be the unit shown on the bid form. Payment shall be based upon the actual quantity multiplied by the unit prices. Where work is to be performed at a lump sum price, the lump sum shall include all operations and elements necessary to complete the work. No payment will be made for any material wasted, unused, rejected, or used for the convenience of the Contractor.

1.2 CONTRACTOR'S DETAILED ITEMIZATION

The selected bidder shall provide the Engineer and the Owner with a detailed Itemization of all the construction costs to include mobilization, equipment, material, labor, insurance, bonds, and other costs related to the construction of Travis Field Water Reclamation Facility. The Engineer will utilize these breakdowns to process monthly pay requests. Each item will be paid based on the percentage of completion at the end of each pay period.

PART 2 – PAYMENT

2.1 4.0 MGD WASTEWATER TREATMENT PLANT

Payment shall be paid monthly according to the Contractor's provided detailed breakdown for each task. The monthly payment will be based on percentage completed for each item, material in storage, and equipment installed which shall include all work for construction of the Wastewater Treatment Plant, complete and operational, except for Items No. 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, and 2.8.

2.2 MBR/MBT MEMBRANE SYSTEMS

Payment shall be based on the lump sum bid allowance for the MBR/MBT membrane equipment and services to be provided by Kubota USA per the scope of supply in Appendix B. This scope of supply does not include tax.

2.3 UV SYSTEM ALLOWANCE

Payment shall be on the basis of the lump sum bid allowance for the UV System by Enaqua per the scope of supply in Appendix C. State sales tax has been added to the scope of supply.

2.4 GRIT REMOVAL SYSTEM ALLOWANCE

Payment shall be on the basis of the lump sum bid allowance for the Hydro International Headcell grit sperator and control panel and Wier / Wemco grit pump and grit classifier per the scope of supply in Appendix D. This scope of supply does not include tax.

2.5 SCREENING SYSTEM ALLOWANCE

Payment shall be based on the lump sum bid allowance for the Screening equipment by Parkson per the scope of supply in Appendix E. This scope of supply does not include tax.

2.6 SCADA SYSTEM ALLOWANCE

Payment shall be on the basis of the lump sum bid allowance for the SCADA equipment and installation to be provided by Emerson per the scope of supply in Appendix F. This scope of supply does not include tax.

2.7 CRUSHED STONE BEDDING

Payment shall be on the basis of the cubic yard unit price in the Bid Proposal which shall include placement of crushed stone bedding.

2.8 REMOVE & REPLACE UNSUITABLE MATERIAL ALLOWANCE

Payment shall be on the basis of the in-place, compacted cubic yard unit price in the Bid Proposal which shall include the removal and lawful reuse or disposal of unsuitable material and replacement with approved offsite borrow material for construction of the wastewater treatment plant.

END OF SECTION

INDEX TO

SECTION 01 00 01

GENERAL REQUIREMENTS

PART 6 – TEMPORARY CONSTRUCTION UTILITIES AND FACILITIES

PART 7 – SAFETY AND CONVENIENCE

PART 8 – TEMPORARY ENVIRONMENTAL CONTROL

PART 9 – PRESERVATION, RESTORATION, AND CLEANUP

PART 10 – SUBMITTALS DURING CONSTRUCTION

SECTION 01 00 01

GENERAL REQUIREMENTS

PART 1 – GENERAL

1.01 DEFINITIONS

A. Not Used

1.02 DESIGN REQUIREMENTS

A. Provide systems, equipment, and components, including supports and anchorages for the design criteria stated on the Drawings, in accordance with the provisions of the 2012 (or the latest) International Building Code (IBC) or the latest applicable Building Code and the Georgia Amendments.

B. These requirements take precedence over other requirements provided elsewhere, subject to Engineer approval.

1.03 ENVIRONMENTAL REQUIREMENTS FOR PAINTING, COATINGS, AND MATERIAL SELECTIONS

A. Throughout the individual Specification sections, the materials of construction and paint and coating systems to be used for some items are dependent upon the specific environment types to which the items will be exposed, as defined below.

B. Environment Types:

1. Interior Dry: Location inside building or structure where floor is not subject to liquid spills or wash down, nor where wall or roof slab is common to a water–holding or earth–retaining structure.

2. Interior Wet: Location inside building or structure where floor is sloped to floor drains or gutters and is subject to liquid spills or wash down, or where wall, floor, or roof slab are common to a water–holding or earth retaining structure.

3. Submerged: Location at or below top of wall of open water–holding structure, such as a basin or channel; or wall, ceiling, or floor surface inside a covered water–holding structure, such as a submersible pump station, scum pit, or manhole; or exterior below grade wall or roof surface of water–holding structure, open or covered.

4. Corrosive: Containment area or area exposed to delivery, storage, transfer, and use of chemicals.

5. Exterior: Location not protected from the weather by a building or other enclosed structure.

C. The individual Specifications define the materials of construction required for the various environment types, unless the material for the item is specifically called

out otherwise on the Drawings or Details.

PART 2 – SUMMARY OF WORK

2.01 SPECIFICATIONS AND DRAWINGS

A. The Specifications and Drawings included in these Contract Documents establish the performance, quality requirements, location, and general arrangement of materials and equipment, and establish the minimum standards for quality of workmanship and appearance. There has been no attempt to separate the Specification sections into groups for work of contractors or various trades. Should there be questions concerning the applicability or interpretation of a particular Specification section or part of a Specification section or Drawing, the questions should be directed to the Owner or Engineer prior to the submittal of a proposal for the Work under this Contract.

2.02 INCLUSIONS

A. Any part of the Work that is necessary or required to make each installation satisfactorily and legally operable, even though it is not specifically included in the Specifications or on the Drawings, shall be performed as incidental work as if described in the Specifications and shown on the Drawings. The expense of such incidental work shall be included in the lump sum bid.

B. The Contractor shall furnish all shop drawings, work drawings, labor, materials, equipment, tools, services and incidentals necessary to complete all work required to these Specifications and shown on the Contact Drawings.

C. The Contractor shall perform the work complete, in place ready for continuous service and shall include any repairs, replacements, or restoration required as a result of damages caused prior by acceptance by Owner.

D. The Contractor shall furnish and install all materials, equipment and labor which is reasonably and properly inferable and necessary for the proper completion of the work, whether specifically indicated in the Contract Documents or not.

E. Coordinate and cooperate all the work with MBR manufacturer to provide complete and fully operational system.

F. Kubota Membrane USA has been chosen to provide Flat Plate MBR membranes and related equipment for this project. Contractor shall engage Kubota to provide the materials, labor, engineering, and help with start-up, commissioning, and related for a complete and functioning system. The Kubota contact for this project is Damone Supica, who can be reached at (425)248-7897 or by email at damone.supica@kubota.com. Contact Kubota for their scope of supply and scope of work. A copy of Kubota bid will be available as an exhibit.

2.03 OWNER OCCUPANCY

A. The Owner intends to occupy and keep operational facilities in the project area

during the life of construction.

B. Cooperate with Owner to minimize conflict with existing operations and to facilitate Owner's operations.

C. Cooperate and coordinate with Owner to provide uninterrupted security and operation.

D. Contractor shall maintain uninterrupted access to compound during life of project.

E. Any impacts to traffic or operations shall be approved by the Owner at least ten business days prior to impact.

2.04 CONSTRUCTION AREAS

A. The Contractor shall limit his use of the construction areas for work and for storage, to allow for:

1. Work by Contractors.

2. Owner's Use.

3. Security.

B. Coordinate use of work site under direction of Engineer and Owner's Representative.

C. Assume full responsibility for the protection and safekeeping of products under this Contract, stored on the site.

D. Move any stored products under the Contractor's control, which interfere with operations of the Owner, or separate contractor.

E. Obtain and pay for the use of additional storage of work areas needed for Contractor operations.

2.05 PROJECT DESCRIPTION

A. A brief description of the Work is stated in these Documents. To determine the full scope of the project or any particular part of the Project, refer to the Specifications and Drawings.

B. The following additional information, though not all-inclusive, is given to assist contractors in their evaluation of the Work required to meet the Project objectives.

C. The New Water Reclamation Facility at the Travis Field project consists of the following components (this is not an all-inclusive scope of work):

1. Headwork's facility, including mechanical screening Grit removal system I associated piping and controls.

2. EQ tanks, mixing system and EQ pump station
3. Anaerobic, Pre-Anoxic, Pre-aeration, post anoxic, and membrane thickening basins including submersible mixer(s), diffused aeration system, blowers, and recycle pumps/wet well.
4. Membrane Bioreactor (MBR) basins and covered equipment area.
5. A two-story Building to provide the following:
   a. Blowers, pumps and other equipment.
   b. Storage and feed for sodium hydro chlorite, caustic soda, etc.
   c. Control Room, associated casework & equipment
   d. Electrical/MCC Room, associated equipment
   e. Mechanical Room, associated equipment
   f. Store Room
   g. Bath room and shower
   h. Breakroom
   i. Etc.
6. Monorail beam and hoist system for MBR filters.
7. Flow monitoring.
8. Screenings dumpsters and slab for screenings and grit.
9. MBR filter wash pad on grade.
10. Screening structure.
11. Plant drain pump station.
12. Associated process and non–process yard and plant piping.
13. Associated site pavement, grading and related.
14. Two diesel engine generators with fuel tank, mechanical and electrical accessories and access walkway.
15. Associated instrumentation and control equipment.
16. Associated communications system including Programmable Logic Controller (PLC), Input/output (I/O) modules and Scada.
17. Associated electrical equipment and work.
18. Associated grounding and lightning protection systems.
19. Site and facility lighting.
20. Chemical storage and delivery system
21. Effluent pumping station.
22. Water supply line.
23. Sludge dewatering system
24. UV system
25. Electrical, control, conduit, wiring, etc.
26. Plant fencing
27. MBR membranes, equipment and related.
28. Piles and other structural supports.

2.06 WORK BY OTHERS

A. Construction activities (i.e. compacting, pile driving, etc.) generate vibrations. Although the facility is segregated, nevertheless, the contractor shall monitor the excessive vibration that may damage the surrounding structures. In case the owner decided to obtain a private firm for vibration monitoring, the contractor shall cooperate with the vibration monitoring company and provide at least a 15-working days' notice to Engineer before commencing pile driving operations.

PART 3 – SEQUENCE OF OPERATIONS

3.01 SCHEDULING

A. Plan the Work and carry it out with minimum interference to the operation of the Owner and other subcontractors. Prior to starting the Work, confer with the Owner to develop an approved work Schedule.

B. It may be necessary to do certain parts of the construction work outside normal working hours in order to avoid undesirable conditions as determined by the Engineer and Owner. The Contractor shall do this work at such times and at no additional cost to the Owner.

C. The Contractor shall provide a plan and sequence of construction to ensure minimum disruption to other subcontractors and the MBR System Supplier and the Owner and shall accept the Owner's decisions for conflict resolution. The plan shall describe all operations with durations and sequence of operation. The plan shall indicate all temporary measures and connection to avoid interruptions. The plan shall be subject to the Owner's review and approval. The plan shall include shop drawing reviews, performance testing, start-up and related.

D. The Contractor shall be working onsite at the same time as the other subcontractors. All subcontractors shall coordinate their schedules with the Contractor and with each other and shall meet at a weekly construction coordination meeting for that purpose. More frequent coordination meetings may be required by the Contractor, Owner or Engineer if deemed necessary.

E. Overall Project Schedule:

1. General:

   a. Contractor shall submit with the bid proposal the name(s) of personnel who shall be responsible for the planning, scheduling, and updating of the Contractor's schedule. Contractor's personnel assigned to the planning and scheduling duties shall have substantive experience in the computer application of Critical Path Method (CPM) planning and scheduling.

   b. As a prerequisite to the approval of payment for work, Contractor shall be required to submit periodic updates to the Owner. The regularity of such updates shall be negotiated and agreed by the Contractor and Owner following contract award. Updates shall be at least monthly. All schedules submitted to the Owner shall be in a format acceptable to the Owner.

   c. Upon request by the Owner or Engineer, a current copy of the schedule shall be provided within 24 hours.

   d. Contractor shall be required to use the Precedence Diagram Method (PDM) of CPM planning and scheduling.

e. Contractor may employ a qualified Subcontractor or consultant to perform the planning; and scheduling duties. Assignment of a Subcontractor shall in no way alter or reduce the Contractor's obligations to perform the required planning and scheduling requirements.

f. It is the Contractor's sole responsibility to ensure that all of the Subcontractors and suppliers provide the required information, in sufficient detail, so that Contractor meets the requirements of the contract.

g. The Contractor shall maintain the Project Master Schedule. Contractor's schedules shall be incorporated in the development phase and at regular updates of the Project Master Schedule. Project float is for the use of the project and not for exclusive benefit of the Contractor. Float may be used to mitigate changes in the Work or other events which may delay performance or completion of the Project.

h. Work Restrictions: Show the effect of the following items, as applicable, on the schedule:

1. Coordination with existing construction.
2. Limitations of continued occupancies.
3. Uninterruptible services.
4. Partial occupancy before Substantial Completion.
5. Use of premises restrictions.
6. Environmental control.

i. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

1. Submittals.
2. Mockups.
3. Fabrication.
4. Sample testing.
5. Deliveries.
6. Installation.
7. Tests and inspections.
8. Building flush-out.
9. Startup and placement into final use and operation.

j. Construction Areas: As applicable, identify each major area of construction for major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

1. Structural completion.
2. Temporary enclose and space conditioning.

3. Permanent space enclosure.
4. Completion of mechanical installation.
5. Completion of electrical installation.
6. Substantial Completion.

k. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Commencement of Work, Testing, Startup, Substantial Completion, Notice of Occupancy and Use, and Final Acceptance. As applicable, also include milestones for Partial Substantial Completion and Partial Notice of Occupancy and Use.

l. Recovery Schedule: When periodic update indicates the Work is fifteen or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

2. Submit detailed testing plant startup and performance monitoring schedule.

3. Progress Reports:
   a. Weekly progress coordination meetings shall be held at the jobsite and attended by the Contractor and Owner's Representative. The schedule shall be reviewed at each meeting. Immediately prior to the meeting, the Contractor shall obtain from the subcontractors the necessary information to update the Schedule to reflect progress to date. The updated Schedule shall be available at the meeting for review. At a minimum, the following items shall be reviewed at the meetings:
      1. Overall project schedule status.
      2. Activities started and completed during the previous week.
      3. The remaining duration required to complete each current activity.
      4. The remaining duration or schedule impacts for selected activities not yet started.
      5. The Change Orders and proposed sequencing changes to the network diagram.

3.02 PERMITTING

A. Contractor shall acquire all required permits associated with the work covered under this contract and shall be responsible for all required application and permit fees. Contractor shall have the necessary local licenses including a county business license.

3.03 COORDINATION

A. Other Subcontractors, employed by the Owner directly, may be completing work items on the property, independent of the scope of services for this contract. Contractor shall ensure coordination of his Subcontractor's with those employed by the Owner and the Owner.

B. If any difficulty or dispute should arise in the accomplishment of the above coordination or with concurrent activities on the property, the Owner shall be notified immediately.

C. All Subcontractors working for the Contractor on this site are subject to this requirement for cooperation, and all shall abide by the resolution agreed upon by the Contractor and Owner, without additional cost to the Owner.

3.04 EQUIPMENT AND SYSTEM TESTING

A. Specific performance testing of installed equipment and systems shall be conducted by the Contractor, Vendor, or Manufacturer's Representative in the presence of the Owner or Owner's Representative, as required in the Specifications and/or Drawings.

B. The Contractor shall furnish all labor, materials, tools, equipment, instruments, consumables, and services necessary to perform the functional and performance testing.

3.05 SEQUENCE OF CONSTRUCTION

A. Contractors shall first install tree protection (if needed) and erosion protection, and have it inspected prior to commencing work.

B. The demolition and removal of all the existing plant shall occur prior to any construction of the new plant.

PART 4 – SITE CONDITIONS

4.01 SITE INVESTIGATION AND REPRESENTATION

A. The Contractor acknowledges satisfaction as to the nature and location of the Work, access to the site through the Air National Guard gate and obtaining identification badges (via DOD) for all workers and subcontractors, the general and local conditions, particularly those bearing upon availability of transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads, and uncertainties of weather, or similar physical conditions at the Site, the conformation and conditions of the ground, the character of equipment and facilities needed prior to and during the execution of the Work, and all other matters which can in any way affect the Work or the cost thereof under this Contract.

B. The Contractor further acknowledges satisfaction as to character, quality, and quantity of surface and subsurface materials to be encountered from the contractor's inspection of the site and from reviewing any available records of exploratory work furnished by the Owner. Failure by the Contractor to become acquainted with the physical conditions of the site and all the available information will not relieve the Contractor from responsibility for properly estimating the difficulty or cost of successfully performing the Work.

C. The Contractor warrants that, as a result of examination and investigation of all the aforesaid data, the Contractor can perform the Work in a good and workman-like manner and to the satisfaction of the Owner and Engineer. The Engineer and the owner assumes no responsibility for any representations made by any of its officers or agents during or prior to the execution of this contract.

4.02 INFORMATION ON SITE CONDITIONS

A. General: Any information obtained by the Engineer regarding site conditions, subsurface information, groundwater elevations, existing construction of site facilities as applicable, and similar data will be available for inspection at the office of the Engineer upon request. Such information is offered as supplementary information only. The Engineer assumes no responsibility for the completeness or interpretation of such supplementary information.

4.03 SUBSURFACE INVESTIGATION

A. Subsurface investigations, including test borings, have been made to indicate subsurface materials at particular locations. Engineer assumes no responsibility whatsoever in respect to the sufficiency or accuracy of the interpretations made of subsurface conditions, and there is no warranty or guarantee, either expressed or implied, that the conditions indicated by such investigations are representative of those existing throughout such area, or any part thereof, or that unforeseen developments may not occur.

B. The Contractor may make arrangements with the Owner for permission to conduct, at the Contractor's own expense such additional subsurface investigation as may be necessary to verify existing conditions. Contractor shall share the results of those investigations with the Owner and Engineer.

4.04 DIFFERING SUBSURFACE CONDITIONS

A. In the event subsurface or latent physical conditions are found materially different from those indicated in these Documents and differing materially from those ordinarily encountered and generally recognized as inherent in the character of work covered in these contract Documents, the Contractor shall promptly, and before such conditions are disturbed, notify the Owner and Engineer in writing of such changed conditions.

C. The Engineer will investigate such conditions promptly and following this investigation, the Contractor shall proceed with the Work, unless otherwise instructed. If the Engineer finds that such conditions do differ from those anticipated and subsequently, cause an increase or decrease in project cost,

through materials, labor, schedule or other, then any adjustments in cost and time will be addressed as indicated in the General Conditions. The Engineer will make the final decision on all Change Orders to the contract regarding any adjustment in cost or time for completion.

4.05 UTILITIES

A. Contractor shall be responsible for identifying and locating any utilities before starting construction. Damage to any such utilities must be repaired by the Contractor at no additional cost to the Engineer or the Owner.

B. The following is a list of the major known utilities serving the Work area which should be notified if conflicts or emergencies arise during the progress of the Work:

Name of Utility

1. Electrical: Georgia Power
2. Phone: AT&T.
3. Water: City of Savannah
4. Gas: Atlanta Gas
5. Cable: Comcast

4.06 CONTRACTOR'S RESPONSIBILITY FOR UTILITY PROPERTIES AND SERVICE

A. Where the Contractor's operations could cause damage or inconvenience to telegraph, telephone, television, power, oil, gas, water, sewer, irrigation systems, or security systems, the operations shall be suspended until all arrangements necessary for the protection of these utilities and services have been made by the Contractor.

B. Notify all utility offices which are affected by the construction operation at least 72 hours in advance. Under no circumstances expose any utility without first obtaining permission from the appropriate agency or the Owner. Once permission has been granted, locate, expose, and provide temporary support for all existing underground utilities.

C. The Contractor shall be solely and directly responsible to the Owner and operators of such properties for any damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of any injuries or damage which may result from the construction operations under this Contract.

D. Neither the Owner nor its Representative shall be responsible to the Contractor for damages as a result of the Contractor's failure to protect utilities encountered in the Work.

E. In the event of interruption to domestic water, sewer, storm drain, or other utility services as a result of accidental breakage due to construction operations, Contractor shall promptly notify the Owner and the proper authorities. Contractor shall cooperate with said authorities and the Owner in restoration of service as promptly as possible and bear all costs of repair. In no case shall

interruption of any water or utility service be allowed to exist outside working hours unless prior approval is granted by the owner of the utility and the Owner.

F. The Contractor shall replace, at the Contractor's own expense, all existing utilities or structures removed or damaged during construction, unless otherwise provided for in these Contract Documents or ordered by the Owner.

4.07 EXISTING STRUCTURES

A. Take necessary precautions to prevent damage to existing structures whether on the surface, aboveground, or underground.

4.08 FIELD RELOCATION

A. During the progress of construction, it is expected that relocations of the Work may be necessary. Such relocations shall be made only by direction of the Owner. If existing structures are encountered which prevent the construction, and which are not properly shown the Drawings, Contractor shall notify the Owner before continuing with the construction. Engineer shall be informed and, at the direction of the Owner, shall make any necessary field revisions to avoid conflict with the existing structures. If the Contractor shall fail to so notify the Owner when an existing structure is encountered, and proceeds with the construction despite this interference, the Contractor does so at his own risk.

PART 5 – SALVAGE OF MATERIALS

5.01 MATERIAL TO BE SALVAGED

A. Salvage work shall be considered incidental to the lump sum work, and the Contractor's cost shall be included in the applicable items of work in the Proposal.

B. Contractor shall coordinate with Owner equipment and materials to be salvaged, ensuring it does not affect the critical path.

PART 6 – TEMPORARY CONSTRUCTION UTILITIES AND FACILITIES

6.01 LAYOUT OF TEMPORARY FACILITIES

A. Before starting the Work, the Contractor shall submit to the Owner their requirements for space for temporary structures and storage of materials. Should the Contractor require space in addition to that available at the jobsite, the Contractor shall make his own arrangements for storage of materials and equipment in locations other than the construction site. For the allocated space onsite, the Contractor shall submit to the Owner, for approval, the proposed plan and layout for all temporary offices, sanitary facilities, temporary construction roads, storage buildings, storage yards, temporary water service and distribution, and temporary power service and distribution. Contractor shall pay for all temporary facilities.

6.02 CONTRACTOR AND SUBCONTRACTOR'S WORK AREA

A. The Contractor and their subcontractors shall limit their operations and storage of equipment and materials to areas as directed by the Owner. The Contractor shall not disturb any areas delineated by the Owner.

B. The Contractor shall maintain the area during construction in a manner that will not obstruct operations of any existing street areas or existing plant operations. The Contractor shall proceed with their work in an orderly manner, maintaining the construction site free of debris and unnecessary equipment and/or materials.

6.03 TEMPORARY WATER

A. The Contractor will provide all temporary water required for construction. Any temporary installation shall meet all pertinent regulations. Contractor shall contact the City and obtain, install a separate water meter. Contractor shall bear costs for temporary connection to waterlines as directed by the City.

6.04 WATER FOR TESTING

A. The Contractor will provide the necessary water required for testing equipment prior to acceptance of the Work, unless otherwise specifically stated in the Specifications for the equipment, system, or facility. Contractor shall coordinate with the City of Savannah for the volume and timing of when water is used. Contractor shall pay for water needed.

6.05 TEMPORARY ELECTRIC POWER

A. Contractor shall provide separate 480 volt and 120-volt power to the site for construction activities. The permanent facility power supply will be utilized for facility testing and startup.

6.06 SAFETY REQUIREMENTS FOR TEMPORARY ELECTRIC POWER

A. Temporary electric power installation shall meet the construction safety requirements of OSHA, state, and other governing agencies. This shall be the responsibility of the Electrical Subcontractor.

6.07 SANITARY FACILITIES AND DRINKING WATER

A. The Contractor shall provide chemical toilets of suitable type and shall maintain the facilities in a sanitary condition at all times. The chemical toilet shall be of watertight construction so that no contamination of the area can result from its use. The facilities shall conform to code requirements and be acceptable to the sanitary authorities. Upon completion of the Work, the sanitary facilities shall be removed, and the area restored to its original condition.

B. Contractor shall provide suitable drinking water for their workers.

6.08 TEMPORARY TELEPHONE SERVICE

A. The Contractor shall furnish onsite telephone service for himself during the period of construction of the Contract, as he determines necessary.

6.09 STORAGE OF MATERIALS

A. All materials shall be stored in a manner that ensures the preservation of their quality and fitness for the Work. Private property shall not be used for storage purposes without the written permission of the Owner and property owners.

6.10 STORAGE BUILDINGS OR TRAILERS

A. If necessary, the Contractor shall erect or provide as-approved, temporary storage buildings and or trailers of the various sizes as required for the protection of equipment and materials. At or near the completion of the Work, and as directed by the Owner, the temporary storage buildings or trailers shall be dismantled, removed from the site, and remain the property of the Contractor.

B. Upon completion of the work, Contractor shall ensure the area designated for storage buildings and/or trailers is returned, restored according to site and/or grading or landscaping plans.

C. Combustible materials (paints, solvents, fuels, etc.) shall be stored in a well-ventilated building removed from other buildings.

6.11 STORAGE YARDS

A. The City will coordinate with the Air National Guard to obtain necessary storage area. The Contractor shall construct temporary storage yards for the storage of materials that are not subject to damage by weather conditions. Materials such as pipe, reinforcing and structural steel, shall be stored on pallets or racks, off the ground, and stored in a manner to allow ready access for inspection and inventory. Temporary gravel surfacing of the storage yards shall meet with the approval of the ANG. Contractor shall be responsible for the security of all stored materials.

6.12 DEBRIS AND WASTE DISPOSAL FACILITIES

A. The Contractor shall provide trash and debris bins, dumpsters, and containers for proper disposal of waste material. Construction and demolition berms shall be separated from organic, paper, and office material. Contractor shall be responsible for the routine removal of trash and debris.

PART 7 – SAFETY AND CONVENIENCE

7.01 CONSTRUCTION SAFETY PROGRAM

A. The Contractor shall develop and maintain for the duration of this Contract, a Safety Plan in accordance with the provisions of the Contract and applicable regulatory requirements.

B. The Owner shall review the Contractor's performance and compliance with the Safety Plan and retain an appropriate amount (up to TEN percent) of each pay request for noncompliance. The following component will be reviewed as a minimum:

1. Tool box locks.
2. Daily pre–task planning.
3. Task hazard analysis.
4. Equipment assessment checklist.
5. Housekeeping.
6. Use of personal protective equipment.
7. Safe working habits.
8. Weekly, jobsite specific, site inspections.

C. The duty of the Owner to conduct construction review of the Contractor's performance is not intended to include a review or approval of the adequacy of the Contractor's safety supervisor, the Safety Plan, or any safety measures taken in, on, or near the construction site. The contractor is responsible for all compliance.

7.02 SAFE ACCESS BY FEDERAL, STATE, AND LOCAL GOVERNMENT OFFICIALS

A. Authorized government officials shall, at all times, have safe access to the work, and the Contractor shall provide proper facilities for such access and Inspection.

7.03 TRAFFIC MAINTENANCE AND SAFETY

A. The Contractor shall comply with all rules and regulations of the ANG, state, county, and city authorities with regard to closing or restricting the use of public streets or highways. No public or private road shall be closed, except by express permission of the Owner of the and the City. Contractor shall conduct the Work so as to impose the least possible obstruction to traffic and normal commercial pursuits. Contractor shall protect all obstructions within traveled roadways by installing approved signs, barricades, and lights, where necessary for the safety of the public. The convenience of the general public and of residents adjacent to the Project, and the protection of persons and property are of prime importance and shall be provided for in an adequate and satisfactory manner.

7.04 PROTECTION OF PROPERTY

A. The Contractor shall protect stored materials, cultivated trees and crops, and other items located adjacent to the proposed work. Contractor shall notify property Owners affected by the construction at least one week in advance of the time construction begins. During construction operations, Contractor shall construct and maintain such facilities as may be required to provide access by all

property owners to their property. No person shall be cut off from access to their residence or place of business for a period exceeding four hours, unless the Contractor has made special arrangements with the affected persons.

7.05 FIRE PREVENTION AND PROTECTION

A. The Contractor shall perform all work in a fire–safe manner. The Contractor shall supply and maintain on the Site adequate fire–fighting equipment capable of extinguishing incipient fires. The Contractor shall comply with applicable federal, state, and local fire–prevention regulations and requirements of the City Fire Department. Where these regulations do not apply, applicable parts of the National Fire Prevention Standard for Safeguarding Building Construction Operations (NFP A No. 241) shall be followed.

7.06 ACCESS FOR POLICE, FIRE, AND POSTAL SERVICE

A. Contractor shall request approval from the fire department and police department to close any street or portion thereof. No closing shall be made without the Owner's and these departments approval. Contractor shall notify said departments when the streets are again passable for emergency vehicles. Contractor shall not block off emergency vehicle access to consecutive arterial crossings or dead–end streets, in excess of 300 linear feet, without special written permission from the fire department. Contractor shall conduct operations with the least interference to fire equipment access, and at no time prevent such access.

B. Contractor shall maintain postal service facilities in accordance with the requirements of the Postal Service. If necessary, Contractor shall move mailboxes to temporary locations designated by the Postal Service, and at the completion of the Work in each area, replace them in their original location and in a condition satisfactory to the U.S. Postal Service.

PART 8 – TEMPORARY ENVIRONMENTAL CONTROL

8.01 NOISE CONTROL

A. Contractor shall take every action possible to minimize noise caused by construction operations. Operate in compliance with any applicable ordinances, regulations, rules and laws in effect in area pertaining to noise.

B. Provide equipment that operates with least possible noise. Provide electrically operated equipment in work area to extent possible. Equip air intake of compressors with silencers and provide machinery operated by gearing with a type of gearing designed to reduce noise to a minimum. Equip internal combustion engines with mufflers. Maintain equipment silencing features in good condition and use at all times.

C. Comply with approved work hours. Noise shall not occur prior to 8:00 AM nor later than 6:00 PM without prior written approval from the Owner.

8.02 AIR POLLUTION CONTROL

A. Contractor shall exercise every reasonable precaution to keep air pollution to a minimum throughout life of Project.

8.03 WATER CONTROL

A. Contractor shall keep excavations free from water while site grading, structural work, pipe laying, or other construction is in progress.

1. Surface Drainage:

a. Control drainage and stormwater in accordance with the Project stormwater pollution prevention plan. Intercept and divert upstream surface drainage away from work site by use of dikes, curb walls, ditches, pipes, sumps, or other means.

b. Intercept and divert work site surface drainage away from excavation by use of dikes, curb walls, ditches, pipes, sumps, or other means.

c. Design surface drainage systems so they do not cause erosion on or offsite or cause unwanted flow of water.

d. Remove surface drainage system when no longer required.

e. Remove debris and restore site to original condition.

2. Dewatering:

a. All dewatering activities shall meet the requirements of the Site Dewatering Permit and the Owner. Dewatering shall not flood any adjacent or downstream property.

b. Subsurface (groundwater) elevations and storm water runoff vary with the time of year and rainfall amounts across the limits of construction as defined on the Contract Drawings. Neither the Engineer no the Owner can accurately estimate the water elevations that may be encountered during performance of Work.

c. The Contractor shall be responsible for dewatering areas as deemed necessary by the Contractor to allow for the proper construction of the Project and all appurtenances.

d. The Contractor shall at all times during performance of the Work provide and maintain proper equipment and facilities to remove water entering excavations. The Contractor shall keep such excavations dry so as to obtain a satisfactory foundation condition for all Work.

e. The Contractor shall not allow water to accumulate in excavations. The Contractor shall remove water to prevent

softening of the foundation bottom and soil changes detrimental to stability of sub grades and foundations. Sub grade soils which become soft, loose, quick, or otherwise unsatisfactory for support of structure as a result of inadequate dewatering or other construction methods shall be removed and replaced by crushed stone as required by the Consultant at the Contractor's expense. The bottom of excavations shall be firm and without standing water before placing structures or pipes. The Contractor shall provide and maintain pumps, well points, sumps suction and discharge lines, and other dewatering system components deemed necessary by the Contractor to convey water away from excavations.

f. The Contractor shall establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water away from the excavations to collecting or runoff areas. The Contractor shall not use trench excavations as temporary drainage ditches.

g. See Section 31 23 19.01 Dewatering.

8.04 DEBRIS CONTROL

A. The Contractor shall proceed with construction cleanup on a daily basis, as construction progresses. Cleanup consists of removal of mud, oil, grease, trash, used forms, scrap, debris, excess material, and any other items that are unsightly or can cause the tripping or slipping of workmen, ladders, or equipment.

B. Dispose of construction waste material in an authorized disposal area.

8.05 POLLUTION CONTROL

A. Contractor shall take precautions in conduct of operations as necessary to avoid contaminating water in adjacent water sources or water impoundments such as lakes, reservoirs, ditches, waterways, ponds, etc. Do not discharge pollutants such as chemicals, fuels, lubricants, bitumens, raw sewage, and other harmful waste into or alongside streams, impoundments, or into natural or man-made channels leading to them. Do not discharge water used during work on Project that has become contaminated into rivers, streams, ditches, or impoundments.

B. Conduct all earthwork, moving of equipment, water control of excavations or other operations likely to create silting, so as to minimize pollution of rivers, streams, ditches, and impoundments. Do not deposit excavated material in or so near to rivers, ditches, streams, or impoundments that it will be washed away by high water or runoff.

C. Contractor shall not dispose of or wash any equipment or other items in the ocean, Intracoastal Waterway or adjacent ditches.

8.06 EROSION CONTROL

A. Contractor shall use proper and acceptable methods of soil erosion and

sedimentation control for exposed earthwork and assume obligation for fines and related costs resulting from failure to provide adequate protection against soil erosion.

8.07 LIGHT CONTROL

Contractor shall not allow work light used during darkness to shine into adjacent properties. Contractor shall obtain prior written approval from Owner before working at night and using work lights.

PART 9 – PRESERVATION, RESTORATION, AND CLEANUP

9.01 SITE RESTORATION AND CLEANUP

A. At all times during the Work, Contractor shall keep the premises clean and orderly, and upon completion of the Work, repair all damage caused by equipment and leave the project free of rubbish or excess materials of any kind.

B. Contractor shall stockpile excavated materials in a manner that will cause the least damage to adjacent lawns, grassed areas, gardens, shrubbery, or fences, regardless of whether these are on private property, or on state, county, or city right–of–ways. Install silt fence around stock piles to prevent erosion. Install covering as necessary to prevent blown movement. Remove all excavated materials from grassed and planted areas and leave these surfaces in a condition equivalent to their original condition.

C. All existing drainage ditches and culverts shall be reopened, graded, stabilized, and natural drainage restored, unless otherwise indicated on the Drawings. Contractor shall restore culverts, broken or damaged, to their original condition and location.

9.02 TREE REMOVAL

A. Trees and other natural vegetation shall not be removed or disturbed in those areas designated on the Drawings to remain, disturbed or as indicated by the Contractor. Trees removed in other areas of the site shall be disposed of off the Worksite by the Contractor.

9.03 DUST PREVENTION

A. Contractor shall give all unpaved streets, roads, detours, or haul roads used in the construction area an approved dust–preventive treatment or periodically water to prevent dust. Applicable environmental regulations for dust prevention shall be strictly enforced.

9.04 PRESERVATION OF IRRIGATION AND DRAINAGE DITCHES

A. Arrange schedules so that construction will not interfere with the irrigation of cultivated lands, pasturelands or landscaped areas. Construction may proceed during the irrigation season, provided the Contractor constructs, at Contractor's own expense, temporary irrigation ditches, turnouts, and miscellaneous structures

acceptable to the owner of the property.

B. After backfilling of the trenches, restore storm drain ditches destroyed, damaged, or otherwise modified during construction, to a condition equivalent, in the opinion of the Contractor, to the condition of the ditch before construction, or as shown on the Drawings. Ditches so reconstructed shall be built in their original locations.

9.05 DISPOSAL OF WASTE MATERIALS

A. All suitable material, including soil material if excavated during construction, meeting the Project Specifications shall be reused and incorporated into the Project or stock piled in a location noted by the Owner.

B. An on-site disposal area will be provided by the Contractor for the Contractor's use for disposal of waste materials. Waste materials shall be removed from the site prior to substantial completion.

C. The Contractor shall be responsible for loading and transporting waste materials to a suitable disposal area. At no time shall excavated waste be stockpiled adjacent to the excavations.

PART 10 – SUBMITTALS DURING CONSTRUCTION

10.01 GENERAL

A. Requirements in this Section are in addition to any specific requirements for submittals specified in other Sections of these Specifications and the Contract.

B. Method for delivery of submittals to Engineer shall be coordinated and agreed upon with Engineer. Assume delivery (via mail or hand delivery) of hard copies of the submittals will be required.

C. Submitted data shall be fully sufficient in detail for determination of compliance with the Contract Documents. Coordinate submittal numbering and submittal schedule with Engineer immediately following execution of the Contract.

D. Review, acceptance, or approval of substitutions, schedules, Shop Drawings, lists of materials, and procedures submitted or requested by the Engineer shall not add to the Contract amount, and all additional costs which may result therefrom shall be solely the obligation of the Contractor.

E. The Owner is not precluded, by virtue of review, acceptance, or approval, from obtaining a shared credit for construction savings resulting from allowed concessions in the Work or materials thereof.

F. It shall not be the responsibility of the Owner to provide engineering or other services to protect the Contractor from additional costs accruing from such

approvals.

G. No equipment or material for which listings, drawings, or descriptive material is required shall be installed until the Contractor has received approved copies of the Shop Drawings.

H. No "Or Equal" material or equipment shall be installed without approval by the Engineer.

I. The review of drawings by the Engineer will be limited to general design requirements only and shall in no way relieve the Contractor from responsibility for errors or omissions contained therein.

J. Submittals will be acted upon by the Engineer as promptly as possible and returned to the Contractor not later than the time allowed for review in Paragraph Shop Drawing Submittal Procedure. Delays caused by the need for resubmittals shall not constitute reason for an extension of Contract time.

K. The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the material, equipment or method of work shall be as described in the submittal. The Contractor shall verify that all features of all products conform to the specified requirements. Submittal documents shall be clearly edited to indicate only those items, models, or series of equipment, which are being submitted for review. All extraneous materials shall be crossed out or otherwise obliterated. The Contractor shall ensure that there is no conflict with other submittals and notify the Construction Manager in each case where his submittal may affect the work of another contractor or the Owner. The Contractor shall coordinate submittals among his subcontractors and all suppliers.

The Contractor shall coordinate submittals with the work so that work will not be delayed. He shall coordinate and schedule different categories of submittals, so that one will not be delayed for lack of coordination with another. No extension of time will be allowed because of failure to properly schedule submittals. The Contractor shall not proceed with work related to a submittal until the submittal process is complete. This requires that submittals for review and comment shall be returned to the Contractor stamped "No Exceptions Taken" or "Make Corrections Noted."

The Contractor shall certify on each submittal document that he has reviewed the submittal, verified field conditions, and complied with the contract documents.

10.02 SHOP DRAWING SUBMITTAL PROCEDURE

A. The Contractor or vendor shall submit a minimum of two hard copies and one electronic file in Portable Document Format (PDF), to the Engineer for review. Contractor and Engineer may alter submittal requirement based upon method of submittals and approvals agreed upon. Submittals shall be made with sufficient time to allow the Engineer not less than fifteen regular working days for examining each submittal or resubmittal.

B. If the technical content of any submittal deviates from the designs or requirements stated in the Specifications or Drawings, a letter shall accompany it explaining, in detail, the reason for each deviation.

C. Hard copies of submittals shall be legible and intact.

D. Each submittal shall have a package and submittal number that will correspond to the specification section. Coordinate numbering with Engineer before making first submittal.

E. Shop Drawings shall be accurate, distinct, and complete, and shall contain all required information, including satisfactory identification of items, units, and assemblies in relation to the Contract Drawings and Specifications.

F. Shop Drawings shall be submitted only by the Contractor and manufacturer/vendor/supplier, who shall indicate by a signed stamp on the Shop Drawings, or other approved means, that the Contractor has checked and approved the submittal, that the contents are in accordance with Contract requirements, and that the submittal has been checked for dimensions and relationship with work of all other trades involved. The practice of submitting incomplete or unchecked Shop Drawings for the Engineer to correct or finish will not be acceptable. Shop Drawings which, in the opinion of the Engineer, have not been checked by the Contractor will be considered as not complying with the intent of the Contract Documents and will be returned to the Contractor for resubmission in the proper form.

G. When the Shop Drawings have been reviewed by the Engineer, two sets of the submittal will be returned to the Contractor appropriately stamped. If major changes or corrections are necessary, the shop drawing may be rejected, and one set will be returned to the Contractor with such changes or corrections indicated, and the Contractor shall correct and resubmit the Shop Drawings in the same manner and quantity as specified for the original submittal, unless otherwise directed by the Engineer. If changes are made by the Contractor (in addition to those requested by the Engineer) on the resubmitted Shop Drawings, such changes shall be clearly explained in a transmittal letter accompanying the resubmitted Shop Drawings and as noted on the submittal.

H. The review of such Shop Drawings and catalog cuts by the Engineer shall not relieve the Contractor from responsibility for correctness of dimensions, fabrication details, and space requirements, or for deviations from the Contract Drawings or Specifications. Review by the Engineer shall not relieve the Contractor from the responsibility for errors in the Shop Drawings.

I. The Contractor agrees that shop drawing submittals processed by the Engineer do not become Contract Documents and are not Change Orders; that the purpose of the Shop Drawing review is to establish a reporting procedure and is intended for the Contractor's convenience in organizing their work and to permit the Engineer to monitor the Contractor's progress and understanding of the design.

10.03 SHOP DRAWING REQUIREMENTS

A. Shop Drawings referred to herein shall include Shop Drawings and other submittals for both shop and field-fabricated items. The Contractor shall submit, as applicable, the following for all prefabricated or manufactured structural, mechanical, electrical, plumbing, process systems, and equipment:

1. Shop Drawings or equipment drawings, including dimensions, size and location of connections to other work, and weight of equipment.

2. Catalog information and cuts.

3. Installation or placing drawings for equipment, drives, and bases.

4. Supporting calculations for equipment and associated supports specified to be designed by equipment manufacturers or suppliers.

5. Complete manufacturer's specifications, including materials description and paint system.

6. List of materials and supplies required for the equipment prior to, and during startup.

7. List of materials and supplies furnished with the equipment.

8. Samples of finish colors for selection.

9. Special handling instructions.

10. Requirements for routine maintenance required prior to plant startup.

11. List of all requested exceptions to the Contract Documents.

12. Operation and Maintenance Manuals for any equipment furnished.

B. The submittals shall include satisfactory identification of items, units, and assemblies in relation to the Specification section number, and the system or equipment identification or tag number shown on the Drawings, the Process and Instrumentation Diagram (P&ID), or as provided in the applicable Specification section.

C. Should the Contractor propose any item on their Shop Drawings, or incorporate an item into the Work, and that item should subsequently prove to be defective or otherwise unsatisfactory, regardless of the Engineer's preliminary review, the Contractor shall, at the Contractor's own expense, replace the item with another item that will perform satisfactorily.

10.04 RECORD DRAWINGS

A. The Contractor shall prepare a set of Record Drawings for the Project which will include the changes made in materials, equipment, locations, and dimensions of the Work. Each month, or as otherwise agreed, the Contractor shall submit to the

Engineer a current listing and description of each change incorporated into the Work since the preceding submittal. The Contractor shall maintain a set of Record Drawings onsite and shall update the Drawings on a weekly basis. Changes shall be identified in red on the plans.

B. Contractor shall provide project record drawings to the Owner and Engineer accurately depicting the finished work.

10.05 SUBMITTAL OF INTERFACE INFORMATION CONNECTION AND RELATIONSHIP WITH OTHER WORK

A. Where called for on the Specifications and as determined necessary by the Contractor, interface information shall be submitted as specified. This interface information shall be accurate and contain all information necessary to allow the completion of detailed design and construction of the interfacing or connecting work. The Contractor shall include in their negotiation for Contract work, such agreements as may be necessary to ensure the accuracy of Contractor's interface submittal information. In the event additional costs are incurred due to subsequent changes to information given in said interface information, such additional costs shall be borne by the Contractor.

10.06 OPERATION AND MAINTENANCE (O&M) MANUALS

A. The Contractor or Vendor shall furnish eight hard copies and one electronic version of a complete instruction manual for installation, operation, maintenance, and lubrication requirements for each component of mechanical and electrical equipment or system provided. All equipment manufacturers and suppliers shall be made aware of these requirements and all associated costs shall be included in the costs for furnishing the equipment or system. Each instruction manual furnished shall be fixed in hard-back cover, which is clearly labeled to designate the system or equipment for which it is intended with reference to the building and equipment number, and the Specification section where the item is specified.

B. Electronic versions shall be submitted in PDF format on a CD properly labeled to designate the system or equipment for which it is intended with reference to the building and equipment number, and the Specification section where the item is specified.

C. See Section 01 78 23 Operating and Maintenance Information for additional requirements.

10.07 SPARE PARTS AND SPECIAL TOOLS

A. As required for each item of equipment, and as specified in corresponding Specification Sections.

B. All equipment, spare parts, and special tools provided by Contractor or Vendor, shall be properly marked to identify the associated equipment by name, P &ID tag number (if applicable), and manufacturer part number. Parts shall be packaged in a manner for protection against damage from the elements during

shipping, handling, and long-term storage. All spare parts and special tools shall be packaged complete and shipped at one time in appropriately sized, hinged-covered, hard plastic, or metal boxes. The boxes shall be marked to indicate all contents by name and part number. Parts shall be numbered and named in accordance with the Operation and Maintenance Manual identification system.

C. Contractor or Vendor shall also supply a list of recommended spare parts in addition to those required by the Specifications.

D. Use the "Transfer Form" which can be found in Section 01 99 90 Reference Forms, to document the transfer of spare parts and special tools to the Owner.

10.08 EQUIPMENT IDENTIFICATION PLATES AND TAGS

A. Provide manufacturer's standard equipment identification plate, securely mounted on each separate equipment component with manufacturer, model number, serial number, and any other information required to obtain service or replacement parts from manufacturer.

B. Provide a 16-gauge, Type 316 stainless steel equipment tag, 3-inch minimum diameter, securely mounted to each item of equipment using stainless steel wire rope and crimps or other approved mounting method by the Engineer. Tag shall have 3/8-inch high engraved type black enamel filled letters with the equipment name and number as shown on the P&ID Drawings.

10.09 SAMPLES AND TEST SPECIMENS

A. Where required in the Specifications, and as determined necessary by the Contractor, test specimens or samples of materials, appliances, and fittings to be used or offered for use in connection with the Work shall be submitted to the Owner at the Contractor's expense, with information as to their sources, with all cartage charges prepaid, and in such quantities and sizes as may be required for proper examination and tests to establish the quality or equality thereof, as applicable.

B. All samples and test specimens shall be submitted in ample time to enable the Engineer to make any tests or examinations necessary, without delay to the Work. The Contractor will be held responsible for any loss of time due to Contractor's neglect or failure to deliver the required samples to the Owner, as specified.

C. Samples for testing shall be taken during the course of the Work, as required by the Owner.

D. Laboratory tests and examinations that the Owner elects to make in its own laboratory will be made at no cost to the Contractor, except that, if a sample of any material or equipment proposed for use by the Contractor fails to meet the Specifications, the cost of testing subsequent samples shall be borne by the Contractor.

E. All tests required by the Specifications to be performed by an independent laboratory shall be made at the sole expense of the Contractor.

F. Material used in the Work shall conform to the submitted samples and test certificates as approved by the Engineer.

10.10 CERTIFICATES OF COMPLIANCE WITH SPECIFIED STANDARDS AND CODES

A. Certificate of Compliance shall be furnished for materials specified to a recognized standard or code prior to the use of such materials in the Work. The Engineer may permit the use of certain materials or assemblies prior to sampling and testing if accompanied by a Certificate of Compliance. The certificate shall be signed by the manufacturer of the material or the manufacturer of assembled materials and shall state that the materials involved comply in all respects with the requirements of the Specifications. A Certificate of Compliance, clearly identifying what it represents, shall be furnished with each lot of material delivered to the site.

B. All materials used on the basis of a Certificate of Compliance may be sampled and tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the Contractor of the responsibility for incorporating material in the Work which conforms to the requirements of the Contract Documents. Any such material not conforming to such requirements will be subject to rejection whether in place or not.

C. The Owner reserves the right to refuse permission for use of material on the basis of a Certificate of Compliance.

D. The form of the Certificate of Compliance and its disposition shall be as directed by the Owner.

10.11 CERTIFICATES OF DESIGN

A. Where required in the Specifications, Contractor or his subcontractors or vendors shall provide engineering design services by a professional engineer licensed in the State of Georgia.

B. Where engineering design services are required by the Specifications, Subcontractor or Vendor shall provide signed and sealed documents.

10.12 PHOTOGRAPHIC DOCUMENTATION

A. Includes requirements for the following:
   1. Preconstruction photographs.
   2. Periodic construction photographs.
   3. Final completion construction photographs.

B. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

C. Digital Photographs: Submit image files within three business days of taking photographs.

1. Digital Camera: Minimum sensor resolution of 12 megapixels.

2. Format: Minimum 3,200 by 2,400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.

3. Identification: Provide the following information with each image description in file metadata tag:

   a. Name of Project.
   b. Name and contact information for photographer.
   c. Name of Engineer.
   d. Name of Contractor
   e. Date photograph was taken.
   f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
   g. Unique sequential identifier keyed to accompanying key plan.

D. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3,200 by 2,400 pixels.

E. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in file name for each image.

2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect/Engineer.

G. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Engineer.

1. Flag construction limits before taking construction photographs.

2. Take at least 25 photographs to show existing conditions adjacent to property before starting Work.

3. Take at least 40 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.

4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

G. Final Completion Construction Photographs: Take at least 30 color photographs after date of Substantial Completion for submission as project record documents. Engineer will inform photographer of desired vantage points.

1. Do not include date stamp.

10.13 MONTHLY PROJECT STATUS REPORT

Prepare a monthly project status report including the following:

1. Current status of Project:

    a. Schedule.
    b. Cost.
    c. MBE and WBE participation, as applicable.
    d. RFI's.
    e. Submittals.
    f. Manpower.
    g. Safety.

2. Narrative of progress achieved in previous month, activities anticipated for the next month, and issues affecting the rate of progress.

PART 11 – TESTING, CHECKOUT, AND STARTUP SERVICES

11.01 GENERAL

A. The Contractor shall test and check out all systems furnished or installed by the Subcontractor. Piping and valves shall be pressure tested and point–to–point continuity tests shall be completed for wiring. See detailed specifications for testing and checkout requirements.

B. During testing, problems arising from the Contractor's errors and omissions shall be corrected by the Contractor at their own expense.

C. The Contractor shall inform the Owner at least five days in advance of when testing will be performed.

D. The Contractor shall be present during startup to assist in any repairs that may be necessary.

PART 12 – MANUFACTURER'S SERVICES DURING CONSTRUCTION

12.01 GENERAL

A. Competent and experienced technical representatives shall represent the manufacturers of all equipment and systems as may be necessary to resolve assembly, equipment malfunctioning, controls problems, or installation problems at the Worksite which are attributable to, or associated with, the equipment furnished.

B. Provide the minimum number of person–days and trips to the Site specified in the individual Specification sections. These person–days are for the services specified and are not for resolving problems associated with installation, testing, or startup of systems or equipment that are due to deficiencies in the supplied system, equipment, or their associated installation, operation or maintenance instructions

and manuals.

12.02 MANUFACTURER'S CERTIFICATION

A. Manufacturer's representative shall certify in writing that the equipment has been inspected by a Manufacturer's authorized representative, installed in accordance with the manufacturer's recommendations, been serviced with the proper initial lubricants, that applicable safety equipment has been properly installed and that the proper electrical and mechanical connections have been made. Certificate of Proper Installation & Startup for documentation shall be forwarded to Engineer upon completion.

12.03 INSTALLATION ASSISTANCE AND INSPECTION

A. The appropriate manufacturer's representative shall be present to instruct the Contractor and Subcontractor on the proper installation procedures for the specified system or equipment. The manufacturer's representative will also inspect the ongoing installation activities to confirm that they meet all manufacturers' recommendations.

12.04 FUNCTIONAL TESTING

A. The appropriate manufacturer's representative shall be present and assist with the initial test, which shall include, but not be limited to, checking for proper rotation, alignment, speed, excessive vibration, and noisy operation. Initial equipment, system adjustment and calibrations shall be performed in the presence of the Engineer, and with the assistance of the manufacturer's representative. The above-mentioned manufacturer's certification shall include the statement that proper adjustments have been made, and that the equipment or system is ready for plant startup and operation.

B. Where the manufacturer's system or equipment includes instrumentation and controls, use forms in Section 01 99 90 Reference Forms to document proper installation, calibration, and testing.

12.05 OPERATIONAL READINESS TEST (ORT) ASSISTANCE

A. The appropriate manufacturer's representative shall be present to assist the Process Instrumentation and Control Systems (PICS) Supplier with the ORT in accordance with Process Instrumentation and Control Systems (PICS). This assistance shall include confirmation of all signals between the manufacturer's system or equipment and the PICS, as well as confirmation of proper operation of all controls internal to the manufacturer's system or equipment.

12.06 SERVICES DURING PERFORMANCE TESTING AND PLANT STARTUP

A. Where plant startup services are called for in the Specifications, or when technical assistance is necessary due to any malfunction of the equipment furnished, the manufacturer's representative shall furnish such services. The manufacturer's representative shall also assist with final performance and demonstration testing, as required by the Specifications. These services shall continue until such times as the applicable equipment has been successfully performance tested and has

been accepted by the Owner and Engineer for full–time operation. Use the attached Supplement—7, Performance Acceptance Test Sheet for documentation and forward to Owner upon completion.

12.07 TRAINING OF OWNER'S PERSONNEL

A. The manufacturer's representative shall furnish detailed instructions to the Owner's personnel for operation of the specified equipment. These training services shall include pre–startup classroom, onsite equipment instruction, and post–startup classroom, as stated in the Specifications.

B. The training session shall include theory, as appropriate, as well as specific operation and maintenance requirements. Training shall include both classroom and field training sessions. Training session time shall be acceptable to the Owner for staff to attend. Training handouts shall be prepared for each attendee. An electronic version of the handout shall be submitted to the Engineer at least one week prior to the training.

12.08 SUPPLEMENTS

A. The supplements and reference forms listed in Section 01 99 90 Reference forms are part of this Specification.

End of Section

INDEX TO

SECTION 01 15 00

CONTROL OF WORK

SECTION 01 15 00

CONTROL OF WORK

PART 1 – GENERAL

1.01 WORK PROGRESS

A. The Contractor shall furnish personnel and equipment which will be efficient, appropriate and adequately sized to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the time stipulated in the Contract. If at any time such personnel appears to the Engineer to be inefficient, inappropriate, or insufficient for securing the quality of work required for producing the rate of progress aforesaid, the Engineer may advise the Contractor to increase the efficiency, change the character, or increase the personnel and equipment and the Contractor shall conform to such order at no additional cost to the Owner. Failure of the Engineer to give such order shall in no way relieve the Contractor of his obligations to secure the quality of the work and rate of progress required.

1.02 PRIVATE LAND

A. The Contractor shall not enter or occupy private land outside of easements, except by permission of the ANG and the City.

1.03 WORK LOCATIONS

A. Work shall be located substantially as indicated on the drawings, but the Owner and Engineer reserve the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons.

1.04 PIPE LOCATIONS

A. Exterior pipelines will be located substantially as indicated on the Drawings, but the right is reserved to the Owner, acting through the Engineer, to make such modifications in location as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings, etc., are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items where required.

B. Small interior piping is indicated diagrammatically on the Drawings, and the exact location is to be determined in the field. Piping shall be arranged in a neat, compact, and workmanlike manner, with a minimum of crossing and interlacing, so as not to interfere with equipment or access ways, and, in general, without diagonal runs.

1.05 DIMENSION OF EXISTING STRUCTURES

A. Where the dimensions and locations of existing structures are of importance in the installation or connection of any part of the Work, the Contractor shall verify such

dimensions and locations in the field before the fabrication of any material or equipment which is dependent on the correctness of such information.

1.06 OPEN EXCAVATIONS

A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required. If the excavation becomes a hazard, or if it excessively restricts traffic at any point the Owner may require special construction procedures such as limiting the length of open trench, prohibiting stacking excavated material in the street, and requiring that the trench shall not remain open overnight at no additional cost.

B. The Contractor shall take precautions to prevent injury to the public and employees due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be barricaded and well lighted at all time when construction is not in progress.

1.07 DISTRIBUTION SYSTEMS AND SERVICES

A. The Contractor shall avoid interruptions to power, water, telephone, communications, cable TV, sewer, gas, or other related utility services. He shall notify the Owner and the appropriate agency well in advance of any requirement for dewatering, isolating, or relocating a section of a utility, so that necessary arrangements may be made. The contractor shall coordinate all such arrangements.

B. If it appears that utility service will be interrupted for an extended period, the Contractor shall provide temporary service lines at the Contractor's expense. Inconvenience of the users shall be kept to the minimum, consistent with existing conditions. The safety and integrity of the systems are of prime importance in scheduling work.

1.08 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

A. The Contractor shall assume full responsibility for the protection of all buildings, structures and utilities, public or private, including poles, signs, services to building utilities, gas pipes, water pipes, hydrants, sewers, drains and electric, communications, cable and telephone cables and other similar facilities, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's operation shall be repaired by the Contractor at his expense.

B. The Contractor shall bear full responsibility for obtaining locations of all underground structures and utilities (including existing water services, drain lines and sewers). Services to buildings shall be maintained and all costs or charges resulting from damage thereto shall be paid by the Contractor.

C. Protection and temporary removal and replacement of existing utilities and structures as described in this Section shall be a part of the work under the Contract and all costs in connection therewith shall be included in the price established in the Bid.

D. If permanent relocation of a utility is required and is shown on the drawings, it shall be included in the contractor's base bid. The Contractor will notify the utility to perform the work as expeditiously as possible. The Contractor shall notify public utility companies in writing at least 48 hours (excluding Saturdays, Sunday and legal holidays) before excavating near their utilities.

1.09 TEST PITS

A. Contractor shall explore by test pits (or other means) for the purpose of locating and confirming underground pipeline or structures in advance of the construction. Test pits shall be backfilled immediately after the utility location and the surface shall be restored in a manner equal or better than the original condition. No separate payment will be made. Report in writing finding to Engineer and Owner.

1.10 CARE AND PROTECTION OF PROPERTY

A. The Contractor shall be responsible for the preservation of all public and private property and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition equal or better to existing before the damage was done, or he shall make good the damage in another manner acceptable to the Owner.

B. All sidewalks and paved areas which are disturbed by the Contractor's operations shall be restored to their original or better condition by the use of similar or comparable materials. All curbing shall be restored in a condition equal to the original construction and in accordance with the best modern practice.

C. Along the location of this work, all fences, walks, bushes, trees, shrubbery, and other physical features shall be protected and restored in a thoroughly workmanlike manner unless otherwise shown on the drawings. Fences and other features removed by the Contractor shall be replaced in the same location. All grass areas beyond the limits of construction which have been damaged by the Contractor shall be regraded and sodded to equal or exceed original conditions.

D. Trees close to the work which drawings do not specify to be removed shall be fenced or otherwise protected against injury. The Contractor shall trim all branches that are liable to damage because of his operations, but in no case shall any tree be cut or removed without prior notification to the Engineer. All injuries to bark, trunk, limbs, and roots of trees shall be repaired by dressing, cutting, and painting according to approved methods, using only approved tools and materials. All work to trees shall be performed by a licensed arborist.

E. The protection, removal, and replacement of existing physical features along the line of work or near the work shall be a part of the work under the Contract and all costs in connection therewith shall be included in the unit or lump sum prices established under the items in the Bid.

1.11 MAINTENANCE OF TRAFFIC

A. Open pits, trenches, unpaved streets, debris, or other obstructions due to construction that will prevent the normal flow of traffic during an extended construction stoppage, for any reason, shall be minimized. In the event an extended construction stoppage is found to be necessary, Contractor shall, at his own expense, provide normal traffic flow during extended construction stoppage. Extended stoppage will be defined by the Owner.

B. All excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times. If the Contractor's operations cause traffic hazards, he shall repair the road surface, provide temporary roadways, erect wheel guards or fences, or take other safety measures which are satisfactory to the Engineer and Owner.

C. Detours around construction areas will be subject to the approval of the Owner and the Engineer. Where detours are permitted, the Contractor shall provide all necessary barricades and signs as required to divert the flow of traffic. While traffic is detoured, the Contractor shall expedite construction operations and periods when traffic is being detoured will be strictly controlled by the Owner.

1.12 WATER FOR CONSTRUCTION PURPOSES

A. The *Contractor* shall provide water for construction purposes. Contractor shall contact the City and obtain required water meter. The meter shall be install in accordance to the City requirements with appropriate backflow preventer valves.

B. *Contractor* shall provide water for hydrostatic and leakage testing

C. Leakage tests for basins shall be performed on individual basins.

D. The Contractor shall be responsible for paying for all water needed to preform retest due to failed prior test.

1.13 MAINTENANCE OF FLOW

A. The Contractor shall make sure the flow in and out of the existing pump station are uninterrupted during the progress of the work. During flow by pass during pump station upgrade, the contractor shall provide adequate means (including sufficient pumping capacity) to bypass the pump station. The entire procedure of maintaining existing flow shall be fully discussed with the Engineer and Owner well in advance of bypassing of any flow.

1.14 CLEANUP

A. During the course of the work, the Contractor shall keep the site of his operations in as clean and neat a condition as is possible. He shall dispose of all residue resulting from the construction work and at the conclusion of the work, he shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures, and any other refuse remaining from the construction operations and shall leave the entire site of the work in a neat and orderly condition. All areas shall be graded to drains. All disturbed areas shall be grassed. All pavement and walkways shall be cleaned.

1.15 COOPERATION WITHIN THIS CONTRACT

A. All firms or person authorized to perform any work under this Contract shall cooperate with the General Contractor and his subcontractors or trades and shall assist in incorporating the work of other trades where necessary or required.

B. Cutting and patching, drilling, and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the Engineer.

C. General Contractor shall cooperate with MBR manufacturer during installation, testing and commissioning.

1.16 PROTECTION OF CONSTRUCTION AND EQUIPMENT

A. All newly constructed work shall be carefully protected from damage in any way. No wheeling or walking or placing of heavy loads on it shall be allowed and all portions injured shall be reconstructed by the Contractor at his own expense.

B. All structures shall be protected in a manner approved by the Owner. Should any of the floors or other parts of the structures become heaved, cracked, or otherwise damaged, all such damaged portions of the work shall be completely repaired and made good by the Contractor, at his own expense and to the satisfaction of the Owner. If, in the final review of the work, any defects, faults, or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship without extra compensation or the materials and labor required.

Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein, for at least the warranty period describe in the Contract.

1.17 CONSTRUCTION WITHIN RIGHT-OF-WAY

A. Where pipe lines are installed within the DOT right-of-way, all excavation backfill and compaction for the purpose of reconstructing roadways and adjacent slopes contiguous thereto shall be in accordance with the DOT or County Standards and Specifications, whichever is applicable. Contractor shall satisfy the authorized representative of the DOT with respect to proper safety procedures, construction methods, required permitting, etc., within the DOT right-of-way.

1.18 CLEANUP AND DISPOSAL OF EXCESS MATERIAL

A. During the course of the work, the Contractor shall keep the site of his operations in as clean and as neat a condition as is possible. He shall dispose of all residue resulting from the construction work and, at the conclusion of the work, shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures, and any other refuse remaining from the construction operations, and shall leave the entire site of the work in a neat and orderly condition.

B. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, the Contractor and his subcontractors shall comply with all applicable Federal, State, and local laws, and regulations concerning waste material disposal, as well as the specific requirements stated in this Section and elsewhere in the Specifications.

C. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors, and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the Contractor or any person employed by him will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. Therefore, the Contractor will be required to remove the fill at his own expense and restore the area impacted.

PART 2 – PRODUCTS

None this Section.

PART 3 – EXECUTION

None this Section.

END OF SECTION

INDEX TO

SECTION 01 21 00

ALLOWANCES

SECTION 01 21 00

ALLOWANCES

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes administrative and procedural requirements governing allowances.

1. Certain materials and equipment are specified in the Contract Documents by allowances. The equipment allowances for these **does not** include installation. Some allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment and defer definition of work to a later date when additional information is available for evaluation. Allowances are also used when the exact scope, quantity or type of work product is unknown.

B. The Contractor shall include in the Base Bid Contract Sum all allowances stated in the Contract Documents. These allowances shall cover the cost of the fees, processing, licenses, materials, labor, equipment and related required items. Allowances shall include all applicable taxes. The Contractor's scheduling, handling costs on the site, unloading, uncrating, cleaning, secure storage and protection, labor, installation costs, administration, supervision, interest, bonds, insurance, all applicable taxes, overhead, profit and other related costs (including but not limited to required permits, inspections, certifications, and testing) shall be included in the Contract Base Bid and not in the allowances.

C. Amounts specified below pertain to all applicable costs.

D. The Contractor shall provide a copy of all paid invoices with the description of the work performed or fees paid for applicable allowance items, to the Owner, with monthly Pay Request Application.

E. All allowances shall be included in the Base Bid.

F. Contractor is responsible for losses incurred from allowance items that are damaged while under his care, such as while stored or during installation.

G. Owner may adjust individual allowance amounts by transferring an amount between allowances if needed. Written confirmation is required to transfer limit amount.

1.02 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, Contractor shall advise Engineer in writing of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the work.

B. Include all allowances and the dates when a decision on an allowance is needed from Owner in project schedule. The Contractor's schedule should account for the time required to obtain competitive prices.

C. At Engineer's request, Contractor shall obtain proposals for each allowance for use in making final selections. Proposals shall include recommendations that are relevant to performing the work.

D. Purchase products and systems selected or approved or obtained by advertised bidding process by Owner and Engineer from the designated supplier. These are including:
   a- MBR equipment (Kubota USA)
   b- UV system (Enauqa)
   c- Influent screening (Parkson)
   d- Grit removal system (Hydro

1.03 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the forms specified.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

1.04 UNUSED MATERIALS

A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

   1. If requested by Engineer, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Engineer, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

   2. If allowance is not used in whole or in part, the Owner shall remove an allowance from the construction contract by change order based on the value listed for the associated unit price.

1.05 COORDINATION

A. Coordinate allowance items with other portions of the work. Furnish templates as required to coordinate installation.

1.06 ADJUSTMENT OF ALLOWANCE COSTS

A. General

   1. If the cost, when determined, is more or less than the allowance, the Contract Sum shall be adjusted accordingly by change order, which will include overhead and profit for any increase or decrease from the

original allowance. The Contractor is not entitled to all or any part of an unexpended balance of the allowance.

B. Documentation

1. Submit documentation for costs or other expenses under the allowance, within ten days after completion of execution of the work or when requested by Engineer prior to execution of the work.

2. Failure to submit claims within the designated time will constitute a waiver of claims for additional costs.

3. At contract closeout, reflect all approved changes in contract amounts in the final statement of accounting.

4.

PART 2 – SCHEDULE OF CASH ALLOWANCES

All allowances noted below shall be included in the Lump Base Sum bid amount.

2.01 MBR EQUIPMENT ALLOWANCE

Allow **$2,932,077.00** (including Tax) for all MBR equipment as listed by **Kubota.**

2.02 UV DISINFECTION ALLOWANCE:

Allow **$559,170.00** (Including Tax) for all UV equipment as listed by **Enaqua.**

2.03 GRITE SYSTEM CONTINGENCY ALLOWANCE:

Allow **$376,000.00** (Including Tax) for all grit system equipment as listed by **Principal Environmental.**

2.04 INFLUENT SCREENING ALLOWANCE:

Allow **$ 761,127 .00** (Including Tax) for all Influent Screens as listed by **The TDH Company.**

2.05 PLANT SCADA SERVICES ALLOWANCE:

Allow **$ ------- .00** (Including Tax) for all plant SCAD services as listed by **The Emerson**

2.06 WORK NOT INCLUDED IN ALLOWANCE ITEMS:

Complete installation of the equipment and any other ancillary parts needed shall not be included in the allowance. All testing required by the specification shall not be included in the allowance.

PART 3 – EXECUTION

3.01 PREPARATION

A. Contractor shall examine products covered by an allowance promptly upon delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

B. Contractor shall coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

END OF SECTION

INDEX TO

SECTION 01 30 00

SPECIAL PROJECT PROCEDURES

SECTION 01 30 00

SPECIAL PROJECT PROCEDURES

PART 1 - GENERAL

1.01 PERMITS AND BUSINESS LICENSES

A. Upon notice of award, the Contractor shall immediately apply for all applicable permits not previously obtained by the Owner to do the work from the appropriate governmental agency or agencies and applicable business licenses. These permits include but are not limited to a Ga. Utility Contractors License and local building permit. No work shall commence until all applicable permits and licenses have been obtained and copies delivered to the Engineer. The costs for obtaining all permits and licenses shall be borne by the Contractor.

1.02 ACESS TO THE SITE

The Travis Field WRF facility is located within the Air National Gard (ANG) training site, and as such, all personnel, contractors, visitors, and equipment delivery drivers must obtain (or be escorted by a qualified badge person) an entry badge through the DOD. All vehicles entering the site must have proper and valid registration and liability insurance. All vehicles entering or leaving the ANG property are subject to inspection by the ANG security staffs.

1.03 TESTING & SPECIAL INSPECTION

The City uses a third-party testing firm to conduct testing required in the contract documents. However, if the test failed, the contractor shall pay for retesting.

The City requires 3rd party Special Inspection and will contract for the Special Inspections specified by the IBC.

1.04 CONTRACTOR STORAGE AREA

The Travis Field WRF construction site lacks the needed space for material and equipment storage. The ANG has provided a limited space close to the construction site for the contractor to store materials (see site map at the bottom of section). The following shall be addressed by the contractor for the duration of the construction;

A- The Contractor shall construct a temporary six-foot high chain link fence around the temporary storage area and materials as required by the ANG. The fence shall include plastic strip inserts, colored brown, so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit.

B- The site shall be used to store construction materials such as pipe, valves, fittings, wood, steel beams, precast concrete, etc. No hazardous materials

such as paint, fuel, chemicals, etc. shall be stored on the ANG storage site.

C- Security- the contractor is responsible for 24/7 security of their equipment. The site shall be secured, and gates are locked at the end of each working day

D- Signage- The contractor shall install a sign at the gate for two point of emergency contact names and phone numbers

E- Extreme Weather- The contractor shall monitor the weather for possible high winds, tornados, and hurricanes to make sure all materials are secured in place to the satisfaction of the ANG.

F- Road Damage- The contractor shall take pictures of the existing access roads to the storage site before the construction. Any obvious excessive damage to these roads shall be repaired at contractor expense.

G- After the construction is completed, the contractor shall remove all stored materials, debris, fence, gate, etc. and return the site to original condition.

1.05 CONNECTIONS TO EXISTING SYSTEM

A. The Contractor shall perform all work necessary to locate, excavate and prepare for connections to the terminus of the existing systems all as shown on the Drawings or where directed by the Owner or Engineer. The cost of this work and for the actual connection to the existing systems shall be included in the price bid for the project and shall not result in any additional cost to the Owner.

1.06 RELOCATIONS

A. The Contractor shall be responsible for the coordination of the relocation or protection of structures, including but not limited to light poles, power poles, signs, sign poles, fences, piping, conduits, and drains that interfere with the positioning of the work as set out on the Drawings. No relocation of the items under this Contract shall be done without approval from the Engineer.

1.07 EXISTING UNDERGROUND PIPING, STRUCTURES, AND UTILITIES

A. The attention of the Contractor is drawn to the fact that during excavation, the possibility exists of the Contractor encountering various water, sewer, gas, telephone, communication, electrical, or other utility lines not shown on the Drawings. The Contractor shall exercise extreme care before and during excavation to locate and flag these lines so as to avoid damage to the existing lines. Cost for relocation of <u>all</u> existing lines shall be included in the price bid for the project. Should damage occur to an existing line, the Contractor shall bear the cost of all repairs.

B. It is the responsibility of the Contractor to ensure that all utility or other poles, the stability of which may be endangered by the close proximity of excavation, are temporarily stayed in position while work proceeds in the vicinity of the pole and

that the utility or other companies concerned be given reasonable advance notice of any such excavation by the Contractor.

C. The existing utility locations are shown without express or implied representation, assurance, or guarantee that they are complete or correct or that they represent a true picture of underground piping to be encountered. The Contractor shall be responsible for notifying the various utility companies to locate their respective utilities in advance of construction in conformance with all requirements provided for in the State and local requirements.

D. The existing piping and utilities that interfere with new construction shall be rerouted as shown, specified or required. Before any piping and utilities not shown on the Drawings are disturbed, the Contractor shall notify the Engineer of the location of the pipeline or utility as directed. Cost for relocation of existing pipelines or utilities shall be included in the price bid for the project.

E. The Contractor shall exercise care in any excavation to locate all existing piping and utilities. All utilities which do not interfere with complete work shall be carefully protected against damage. Any existing utilities damaged in any way by the Contractor shall be restored or replaced by the Contractor at his expense as directed by the Owner and the owner of the utility.

F. Contractor shall protect existing structures to remain and shall not interrupt existing left station operation without prior Owner approval and coordination.

1.08 HURRICANE AND INCLEMENT WEATHER PREPAREDNESS PLAN

A. During hurricane season the Contractor shall submit to the Engineer and Owner a Hurricane Preparedness Plan. The plan should outline the necessary measures which the Contractor proposes to perform at no additional cost to the Owner in case of a hurricane watch and subsequent plan for a hurricane warning and finally for an evacuation.

B. In the event of inclement weather, or whenever Engineer shall advise, Contractor shall insure that he and his Subcontractors shall carefully protect work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any portion of work or materials is damaged due to the failure on the part of the Contractor or Subcontractor to protect the work, such work and materials shall be removed and replaced at the expense of the Contractor.

1.09 POWER SUPPLY

A. Electricity as may be required for construction and temporary power supply shall be secured and purchased by the Contractor from the power company.

1.10 DEWATERING

A. The Contractor shall conduct groundwater pumping necessary to prevent flotation of any part of the work during construction operations with his own equipment.

B. The Contractor shall pump out water and wastewater which may seep or leak into the excavations for the duration of the Contract and with his own equipment. He shall dispose of this water in an appropriate manner, without causing siltation of any downstream acres or drainage facility.

C. Contractor shall dewater as needed to perform the work or conduct testing at no additional cost to the Owner.

1.11 PUBLIC NUISANCE

A. The Contractor shall not create a public nuisance including but not limited to encroachment on adjacent lands, flooding of adjacent lands, excessive noise or dust, soil vibration or working outside the hours of 8:00 AM to 5:00 PM or working on Saturday and Sunday except by prior approval.

B. Sound levels must meet local ordinances and be no more than 90dBA. No exposure over OSHA regulations is allowed. Sound levels in excess of such are sufficient cause to have the work halted until equipment can be quieted to these levels. Work stoppage by the Owner, Engineer, or regulatory agency for excessive noise shall not relieve the Contractor of the other portions of this specification including, but not limited to, contract time and contract price.

C. Contractor shall continually monitor during the life of the activity vibration from pile driving, soil vibration and similar compaction. Activities producing measurable vibration outside the project site boundary is not allowed. Contractor shall submit monitoring results to Owner and Engineer.

D. No extra charge may be made for time lost due to work stoppage resulting from the creation of a public nuisance.

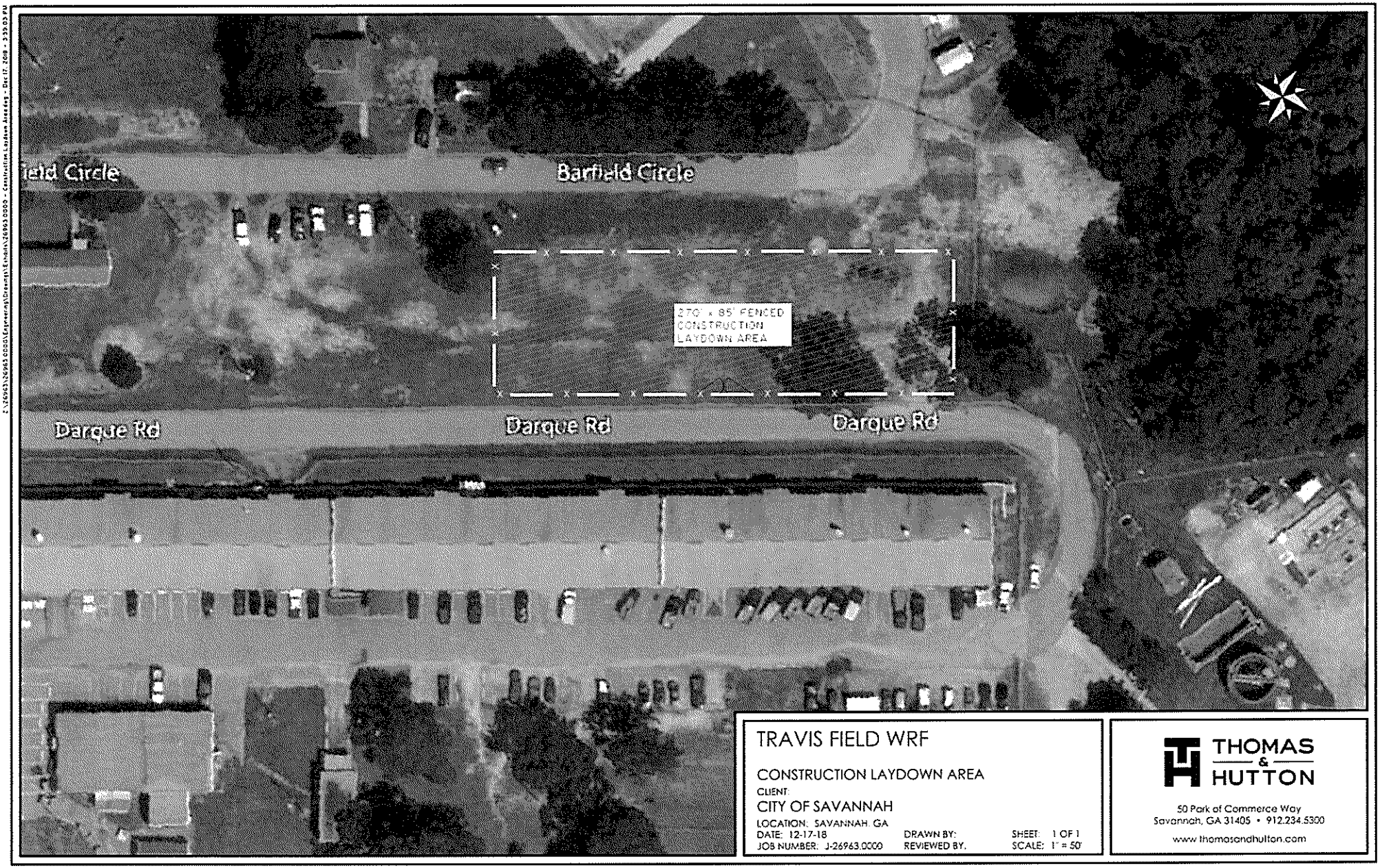
PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION



TRAVIS FIELD WRF

CONSTRUCTION LAYDOWN AREA

CLIENT:
CITY OF SAVANNAH

LOCATION: SAVANNAH, GA
DATE: 12-17-18
JOB NUMBER: J-26963.0000

DRAWN BY:
REVIEWED BY:

SHEET: 1 OF 1
SCALE: 1" = 50'

THOMAS & HUTTON

50 Park of Commerce Way
Savannah, GA 31405 • 912.234.5300
www.thomasandhutton.com

INDEX TO

SECTION 01 31 00

ADMINISTRATIVE REQUIREMENTS

SECTION 01 31 00

ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Coordination and project conditions.

B. Field engineering.

C. Preconstruction meeting.

D. Site mobilization meeting.

E. Progress meetings.

F. Pre-installation meetings.

1.02 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and work of various sections of specifications to ensure efficient and orderly sequence of installation of interdependent construction elements.

B. Verify utility requirements and characteristics of operating equipment are compatible with site utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.

C. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. In finished areas, conceal pipes, and wiring within construction. Coordinate locations of fixtures and outlets with finished elements.

E. Coordinate completion and clean-up of work of separate sections in preparation for Substantial Competition. After Utility occupancy of premises, coordinate access to site and operations for correction of defective Work.

1.03 PRECONSTRUCTION MEETING

A. Engineer will schedule meeting after Notice of Award.

B. Attendance Required: Utility, Engineer, Contractor and applicable Subcontractors.

C. Agenda:

1. Submission of lists of products, schedule of values, and progress schedule.

2. Designation of personnel representing parties in Contract, Utility.

3. Procedures and processing of field decisions, submittals, and substitutions, applications for payments, proposal request, Change Orders, and Contract Scheduling.

4. Procedures for maintaining record documents.

5. Procedures for submitting, receiving, and returning shop drawings

6. Procedures for submitting RFI

7. Scope of Work.

1.04 SITE MOBILIZATION MEETING

A. Engineer and Contractor shall schedule meeting at Project site prior to Contractor occupancy.

B. Attendance Required: Engineer, Utility, Contractor, and major Subcontractors.

C. Agenda:

1. Utility requirements and schedule of closing and bypassing the existing pump station during the pump and pump base replacement.

2. Erosion Controls

3. Underground utilities

4. Demolition procedures

5. Construction facilities and controls

6. Temporary utilities.

7. Survey and layout.

8. Schedules.

9. Procedures for testing.

10. Requirements for start-up of equipment.

11. Requirements for commissioning the plant

12. Inspection and acceptance of equipment put into service during construction period.

1.05 PROGRESS MEETINGS

Schedule and administer meetings throughout progress of the Work at minimum bi-weekly intervals.

A. Make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.

B. Attendance Required: Job superintendent, major subcontractors and suppliers, Utility inspector, Engineer, as appropriate to agenda topics for each meeting.

1.06 PRE-INSTALLATION MEETINGS

A. When required in individual specification sections, convene pre-installation meetings at Project site prior to commencing work of specific section.

B. Required attendance of parties directly affecting, or affected by, work of specific section.

C. Notify Utility, Contractor and Engineer four days in advance of meeting date.

D. Prepare agenda and preside at meeting:

1. Review conditions of installation, preparation and installation procedures.

2. Review coordination with related work.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

INDEX TO

DIVISION I – GENERAL REQUIREMENTS

SECTION 01 33 00

SUBMITTAL PROCEDURES

DIVISION I – GENERAL REQUIREMENTS

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Submittal procedures.

B. Construction progress schedules.

C. Product Data.

D. Shop Drawings.

E. Samples.

F. Design data.

G. Test reports.

H. Certificates.

I. Manufacturer's instructions.

J. Manufacturer's field reports.

K. Erection drawings.

1.2 RELATED SECTIONS

A. Section 01 45 00 – Quality Control: Manufacturers' field services and reports.

B. Section 01 77 00 – Closeout Procedures.

1.3 SUBMITTAL PROCEDURES

A. Transmit each submittal with Engineer accepted form.

B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix. Resubmit as specified for initial submittal. Indicate on revised drawings all changes that have been made other than those requested by the Engineer.

C. Identify Project, Contractor, Subcontractor, or supplier; pertinent drawing and detail number, and specification section number, as appropriate.

D. Apply Contractor's stamp, signed or initialed verifying review, approval, products required, field dimensions, adjacent construction Work, and coordination of

information is in accordance with the requirements of the Work and Contract Documents. Submittal without the Contractor's stamp will be returned to Contractor without Engineer's review.

E. Make all submittals far enough in advance of scheduled dates for installation to provide all required time for reviews, for securing necessary approvals, for possible revision and resubmittal, and for placing orders and securing delivery. In scheduling, allow sufficient time for the Engineer's review following the receipt of the submittal. Coordinate submission of related items. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.

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

G. Provide space for Contractor and Architect/Engineer review stamps.

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

I. Distribute PDF (hard copies if Requested) of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

1.4 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial schedule in duplicate within 30 days after date of Owner–Contractor Agreement.

B. Revise and resubmit as required.

C. Submit revised schedules with each Application for Payment, identifying changes since previous version.

D. Submit a computer generated or horizontal bar chart with separate line for each section of Work, identifying first work day of each week.

E. 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.

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

G. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and required by allowances.

1.5 PRODUCT DATA

A. Product Data for Review:

1. Submitted to Engineer for review and conformance with information given in specifications and the design concept expressed in contract documents.

2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article above.

B. Submit PDF (or number of hard copies Contractor and Owner require, plus two copies retained by Engineer).

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

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

E. After review, distribute in accordance with the Submittal Procedures article above.

1.6 SHOP DRAWINGS

A. Contractor shall submit PDF (or a minimum 6 copies of each shop drawing to the Engineer for review).

B. Submitted to Engineer for review and conformance with information given in specifications and design concept expressed in contract documents. Review of shop drawings by Engineer shall not relieve Contractor of its responsibility for accuracy of shop drawings nor for furnishing of all materials and equipment required by the contract even though such items may not be indicated on shop drawings reviewed by Engineer.

C. Shop drawings shall include applicable technical information, drawings, diagrams, performance curves, schedules, templates, calculations, instructions, measurements, and similar information as applicable to the specific item for which shop drawing is prepared.

D. Do <u>not</u> use Engineer's Drawings for shop or erection purposes.

E. Each shop drawing copy shall bear a Contractor's stamp showing they have been checked. Shop drawings submitted to the Engineer without Contractor's stamp will be returned to Contractor without review.

No review will be given to partial submittals of shop drawings for items which interconnect and/or are interdependent. It is the Contractor's responsibility to assemble shop drawings for all such interconnecting and/or interdependent items, check them and then make one submittal to Engineer.

Schedule of Submittals: Within 30 days of Contract award and prior to any shop drawing submittal, Contractor shall submit a schedule showing the estimated submittal date and desired acceptance date for each shop drawing

anticipated. Time lost due to unacceptable submittals shall be the Contractor's responsibility.

1.7 SAMPLES

A. Samples for Review:

1. Submitted to Engineer for review and conformance with information given in specifications and design concept expressed in contract documents.

2. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above.

B. Samples for Information:

1. Submitted for Engineer's knowledge as contract administrator or for the Owner.

C. Include identification on each sample, with full product information.

D. Submit the number of samples specified in individual specification sections; one of which will be retained by Engineer.

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

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

1.8 DESIGN DATA

A. Submit for Engineer's knowledge as contract administrator or for the Owner.

B. Submit for information and conformance with information given in specifications and design concept expressed in contract documents.

1.9 TEST REPORTS

A. Submit for Engineer's knowledge as contract administrator or for the Owner.

B. Submit test reports for information and assessing conformance with information given in specifications and design concept expressed in contract documents.

1.10 CERTIFICATES

A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or the Contractor to Engineer, in quantities specified for Product Data.

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

C. Certificates may be recent or previous test results on material or product but must be acceptable to Engineer.

1.11 MANUFACTURER'S INSTRUCTIONS

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

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

C. Refer to Section 01 45 00 – Quality Control, Manufacturers' Field Services article.

1.12 MANUFACTURER'S FIELD REPORTS

A. Submit reports for Engineer's benefit as contract administrator or for the Owner.

B. Submit report in duplicate within 30 days of observation to Engineer for information.

C. Submit for information and assessing conformance with information given in specifications and design concept expressed in contract documents.

1.13 ERECTION DRAWINGS

A. Submit drawings for Engineer's benefit as contract administrator or for the Owner.

B. Submit for information and assessing conformance with information given in specifications and design concept expressed in contract documents.

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

1.14 REVIEWED SHOP DRAWINGS

A. Engineer Review.

1. Acceptable submittals will be marked "No Exceptions Taken." A minimum of three copies will be retained by the Engineer for Engineer's and Owner's use and remaining copies will be returned to Contractor.

2. Submittals requiring minor corrections before the product is acceptable will be marked "Furnish as Corrected." Contractor may order, fabricate, and ship items included in submittals, provided the indicated corrections are made.

3. Submittals marked "Revise and Resubmit" must be revised to reflect required changes and the initial review procedure repeated.

4. The "Rejected" notation is used to indicate products not acceptable. Upon return of a submittal so marked, Contractor shall repeat the initial review procedure utilizing acceptable products.

5. Only two copies of items marked "Revise and Resubmit" and "Rejected" will be reviewed and marked. One copy will be retained by Engineer and the other copy with all remaining unmarked copies will be returned to Contractor for resubmittal.

B. No Work or products shall be installed without a drawing or submittal bearing the "No Exceptions Taken" or "Furnish as Corrected" notation. Contractor shall maintain at the job site a complete set of shop drawings bearing Engineer's stamp.

C. Substitutions: In the event Contractor obtains Engineer's acceptance for use of products other than those listed first in Contract Documents, Contractor shall, at Contractor's own expense and using methods accepted by Engineer, make any changes to structures, piping and electrical work necessary to accommodate these products.

D. Use of "No Exceptions Taken" or "Furnish as Corrected" notation on shop drawings or other submittals is general and shall not relieve Contractor of the responsibility of furnishing products of proper dimension, size, quality, quantity, materials, all performance characteristics, and to efficiently perform requirements and intent of Contract Documents. Engineer's review shall not relieve Contractor of the responsibility of errors of any kind on shop drawings. Review is intended only to assure conformance with design concept of the project and compliance with information given in Contract Documents.

1.15 SUBMITTAL CHECKLIST

A. This checklist is not necessarily complete. Contractor is responsible to submit all items and materials as specified in each section.

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
03 00 00 – Concrete					
	Mix Design				
	Curing Compounds				
	Joint Filler				
	Reinforcing Steel				
	Welded Wire Fabric				

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	Dowels				
	Fiber Reinforcement				
03 30 00 – Cast-In-Place Concrete					
	Mix Design				
	Reinforcing Steel				
	Welded Wire Fabric				
	Curing Compound				
	Fiber Reinforcement				
	Non-Shrink Grout				
	Joint Filler				
03 31 00 – Concrete Formwork and Accessories					
	Mix Design				
	Reinforcement				
	Layout Plan				
	Design Loads				
05 05 23 –Metal Fastenings					
	Tie Rods				
	Bearing Plates				
	Turnbuckles				
	Bolts				
	Coating Certification				
05 12 00 – Structural Steel Framing					
	Materials				

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	Design Loads				
	Mill Certificate				
	Mill Test Reports				
	Welder's Certificates				
08 11 13 – Hollow Metal Doors and Frames					
	Door & Frame				
08 16 16 – Fiberglass Doors and Frames					
	Door & Frame				
08 33 23 – Overhead Coiling Doors					
	Door				
08 54 13 – Fiberglass Windows					
	Windows				
08 71 00 – Door Hardware					
	Hardware				
08 80 00 – Glazing					
09 29 00 – Gypsum Board					
09 90 00 – Painting and Coating					
	Paint & Coating				
10 71 14 – Exterior Shutters					
10 80 00 – Miscellaneous Specialties					

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
11 53 13 – Laboratory Fume Hood					
12 35 53 – Laboratory Casework					
13 34 19 – Metal Building Systems					
14 24 00 – Hydraulic Elevator					
22 10 00 – Vertical Turbine Pump					
22 45 00 – Emergency Eyewash and Shower					
23 45 00 – Automatic Sampling					
25 50 00 – Plant SCADA System					
31 00 00 – Earthwork					
	Borrow				
31 09 16.23 – Driven Pile Load Tests					
	Test Method & Equipment				
	Piles				

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
31 23 19 – Sludge Dewatering System					
	All Pumps & equipment				
31 25 00 – Soil Erosion Control					
	Silt Fence				
31 37 00 – Rip–Rap					
	Stone				
	Sand–Cement Bag				
	Filter Fabric				
31 62 13 – Concrete Piles					
	Concrete Pile				
31 62 19 – Timber Piles					
	Piles				
	Preservative Treatment Certification				
	Driving Equipment				
	Pile Driving Sequence				
31 62 44 – Pile Load Test					
32 11 23 – Aggregate Base Course					
	Aggregate				
	Prime				
32 11 26 – Asphaltic Base Courses					
	Asphalt Cement				

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	Anti-Stripping Agent				
	Mix Design				
32 11 33 – Cement – Treated Base Courses					
	Mix Design				
	Prime				
32 12 16 – Asphalt Paving					
	Tack Coat				
	Asphalt Cement				
	Anti-Stripping Agent				
	Mix Designs				
32 31 18 – Electric Gate & Chain Link Fence					
	Fence Fabric				
	Posts				
	Hardware & Accessories				
	Layout Plan				
	Finish				
32 92 00 – Turf and Grasses					
	Seed Mix – Temporary				
	Seed Mix – Permanent				
	Fertilizer				
	Lime				
33 10 00 – Water Utilities					

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	PVC Pipe – 4"Ø and Larger				
	PVC Pipe – Smaller than 4"Ø				
	D.I. Pipe				
	Tubing for Service Lateral				
	Fittings – PVC				
	Fittings – Compact D.I.				
	Gate Valve				
	2" Ball Valves				
	Air Release Valve				
	Air/Vacuum Valve				
	Combination Air Valve				
	Corporation Stops				
	Curb Stops				
	Magnetic Marking Tape				
	Valve Boxes				
	Valve Box Collar				
	Hydrant Tees				
	Threaded Rod with Bitumastic Coating and Painting				
	Fire Hydrants				
	Restrained Joint Fittings				
	Service Saddles				

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	Tapping Sleeves/Crosses				
	Tapping Valves				
	Backflow Prevention Devices				
	Tracing Wire				
	Service Pipe/Tubing				
	Casing Pipe				
33 30 00 – Sanitary Sewage Utilities					
	Wetwell				
	Manholes & Interior Coating				
	Boots and S.S. Straps				
	Joint Wrap				
	Joint Sealant				
	Steps				
	Piping – PVC – Gravity				
	Piping – PVC – Force Main				
	Piping – DI – Gravity				
	Piping – DI – Force Main				
	Fittings – PVC – Gravity				
	Fittings DI – Force Main				
	Frames & Covers				
	Valve Pit and Steps				

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	Valve Pit Hatch Cover				
	Wetwell Hatch Cover				
	Pumps and Controls				
	Control Panel Enclosure and Mounting Materials				
	Frost–Proof Hydrant				
	Backflow Prevention Device				
	Fencing and Gate Hardware				
	Gate Valves/Plug Valves				
	Check Valves				
	Air Release/Vacuum Valves				
	Vent Pipe				
	Hoist and Hoist Sockets				
	Lifting Chain/Cable				
	Pumps Mounts/Intermediate and Upper Guide Brackets				
	Quick Disconnect				
	Electrical W/Generator Hook–up				
	Tracing Wire				
	Magnetic Tape				

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
	Force Main Gauges				
	Signage (Emergency #'s etc.)				
33 32 20 – Wastwater Pump Station					
	Pump & Control				
33 40 00 – Storm Drainage Utilities					
	Reinforced Concrete Pipe				
	Aluminum Pipe				
	Polyethylene Pipe				
	Gaskets				
	Drainage Structures				
	Fiberglass Grating				
	Frames, Covers & Grates				
	Subgrade Drain pipe				
	Filter Fabric				
	Tracing Wire				
33 41 01 – Storm Drain Piping					
40 05 15 – Pipe Hangers and Supports					
40 05 15.10 – Seismic Restraints					
40 05 15.15 – Expansion Control for Piping					

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
40 27 01.02 – Steel Pipe					
40 27 01.03 – Plastic Pipe					
40 27 01.04 – Copper Pipe					
40 27 01.05 – Stainless Steel Piping					
40 27 05.06 – Expansion Joints					
40 27 05.09 – Insulation for Exposed Piping and Equipment					
40 29 01 – Manual Valve and Gate Operator Appurtenances					
40 29 13 – Butterfly Valves					
40 29 19 – Eccentric Plug Valves					
40 29 27 – Nonclog Ball Valves					
40 29 50 – Specialty Valves					
40 31 00 – Fabricated Stainless Steel Gates					
40 31 05 – FRO Weirs					

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
40 40 01 – EQ Tank Jet Mixing Equipment					
40 91 00 – Process Instrumentation					
40 91 16.29 – Magnetic Flow Meters					
40 95 13 – MBR Control Panel					
40 95 20 – MBR SCADA Hardware and Software					
41 22 13 – Overhead Cranes and Hoists					
43 21 21 – Self-Priming Pumps					
43 21 39 – Submersible Pumps					
44 42 19 – Positive Displacement Blowers					
44 42 46 – Submersible Mixers					
44 42 56 – Plant Reuse Water Pump Station					
44 43 73 – Prestressed Concrete Equalization Storage Tank					
44 43 34 – Influent Drum Screen					

Section	Submittal	Date Received by T & H	Accepted Submittal Returned to Owner/ Contractor	Submittal Rejected & Returned	Comments
44 44 19 – Liquid Alum Feed Screen					
44 44 59 – Caustic Feed System					
44 44 73 – Ultraviolet Disinfection System (Non–Contact)					
44 45 16 – Fine Bubble Diffusers					
44 45 16.1 – Effluent Oxygenation System					
45 50 00 – Membrane Bioreactor					
46 23 66 – Grit Removal System					
46 23 67 – Grit Removal Pump					

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

INDEX TO

SECTION 01 45 00

QUALITY CONTROL

SECTION 01 45 00

QUALITY CONTROL

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Quality assurance – control of installation.

B. Tolerances.

C. References and standards.

D. Testing laboratory services.

E. Manufacturer's field services.

1.02 RELATED SECTIONS

A. Section 01 00 01 – General Requirements: Preparation, Procedures, Submittals, Testing.

B. Individual Technical Specification sections: quality assurance requirements, submittals and testing procedures.

1.03 QUALITY ASSURANCE – CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturer's instructions, including each step-in sequence.

C. Should manufacturer's instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

D. 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. Perform Work by persons qualified to produce required and specified quality.

F. Verify field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.04 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturer's tolerances. Should manufacturer's tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Adjust products to appropriate dimensions and positions before securing in place.

D. Accessible routes shall not exceed maximum ADA allowable slopes.

1.05 REFERENCES AND STANDARDS

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes, or stated in the Specifications or Drawings.

B. Conform to current versions of referenced standards, except where a specific date is established by code.

C. Obtain copies of standards where required by product specification sections.

D. The contractual relationships, duties, and/or responsibilities of the parties under Contract with the Owner, including those of the Engineer, shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.06 TESTING SERVICES

A. Contractor will appoint and employ services of an independent firm to perform testing. Contractor shall pay for testing services required by the specifications, except where stated otherwise for Special Inspections.

B. The independent firm will perform tests and other services specified in individual specification sections and as required by the Owner.

C. Testing and source quality control may occur on or off the project site. Perform off–site testing if required by the Specifications, Drawings, or Owner.

D. Copies of the reports will be submitted by the independent firm to the Engineer and Contractor. Reports shall indicate observations and results of tests and shall indicate compliance or non–compliance with applicable requirements.

E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

1. Notify Engineer and independent firm 48 hours prior to expected time for requiring sampling, testing and observation services, unless noted otherwise in the Specifications or Drawings.

2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

F. Testing does not relieve Contractor to perform Work to contract requirements.

G. Re–testing required because of non–conformance to specified requirements shall be performed by the same independent firm under the direction of the Engineer. Payment for re–testing shall be made by the Contractor.

1.07 MANUFACTURER'S FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, observe conditions of surfaces and installations, monitor quality of workmanship, provide training and instructions to operators, and provide start–up, testing, adjustment, and balancing of equipment, as applicable.

B. If a manufacturer's representative observes faulty practices on site related to or affecting their product, they shall report it immediately to the Contractor and Owner.

C. Observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions shall be documented in writing and provided to the Contractor and Engineer.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Verify utility services are available, of the correct characteristics, and in the correct locations.

3.02 PREPARATION

A. Prepare surfaces in accordance with the requirements of the individual technical Specification sections.

END OF SECTION

INDEX TO

SECTION 01 45 23

TESTING AND INSPECTING SERVICES

SECTION 01 45 23

TESTING AND INSPECTING SERVICES

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Selection and payment.

B. Contractor submittals.

C. Testing agency responsibilities.

D. Testing agency reports.

E. Limits on testing authority.

F. Contractor responsibilities.

G. Schedule of tests.

1.02 RELATED SECTIONS

A. Testing and acceptance required by public authorities.

B. Section 01 00 00 – General Requirements: Manufacturer's certificates.

C. Section 01 77 00 – Closeout Procedures: Project record documents.

1.03 REFERENCES (LATEST REVISION)

A. ASTM C 802 – Practice for Conducting an Interlaboratory Test Program to Determine the Precision of Test Methods for Construction Materials.

B. ASTM C 1077 – Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

C. ASTM C 1093 – Practice for Accreditation of Testing Agencies for Masonry.

D. ASTM D 3740 – Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

E. ASTM D 4561 – Practice for Quality Control Systems for Organizations Producing and Applying Bituminous Paving Materials.

F. ASTM E 329 – Specification for Agencies Engaged in Construction Inspection and/or Testing.

G. ASTM E 543 – Practice for Agencies Performing Nondestructive Testing.

H. ASTM E 548 – Guide for General Criteria Used for Evaluating Laboratory Competence.

I. ASTM E 699 – Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components.

1.04 SELECTION AND PAYMENT

A. Employment and payment by Contractor for services of an independent testing agency or laboratory to perform specified testing.

B. Employment of testing agency or laboratory in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

1.05 QUALITY ASSURANCE

A. Comply with requirements of practices listed in paragraph 1.03.

B. Laboratory: Authorized to operate in State in which project is located.

C. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.

D. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

1.06 CONTRACTOR SUBMITTALS

A. Prior to start of Work, submit testing laboratory name, address, and telephone number, and names of full time registered Engineer and responsible officer.

B. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

1.07 TESTING AGENCY RESPONSIBILITIES

A. Test samples of mixes submitted by Contractor.

B. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.

C. Perform specified sampling and testing of products in accordance with specified standards.

D. Ascertain compliance of materials and mixes with requirements of Contract Documents.

E. Promptly notify Engineer and Contractor of observed irregularities or non–conformance of Work or products.

F. Perform additional tests required by Engineer.

G. Attend preconstruction meetings and progress meetings.

1.08 TESTING AGENCY REPORTS

A. After each test, promptly submit three copies of report to Engineer and to Contractor.

B. Include:

1. Date issued.
2. Project title and number.
3. Name of inspector.
4. Date and time of sampling or inspection.
5. Identification of product and specifications section.
6. Location in the Project.
7. Type of inspection or test.
8. Date of test.
9. Results of tests.
10. Conformance with Contract Documents.

C. When requested by Engineer, provide interpretation of test results.

1.09 LIMITS ON TESTING AUTHORITY

A. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Agency or laboratory may not approve or accept any portion of the Work.

C. Agency or laboratory may not assume any duties of Contractor.

D. Agency or laboratory has no authority to stop the Work.

1.10 CONTRACTOR RESPONSIBILITIES

A. Deliver to agency or laboratory at designated location, adequate samples of materials proposed to be used requiring testing, along with proposed mix designs.

B. Cooperate with laboratory personnel and provide access to the Work.

C. Provide incidental labor and facilities:

1. To provide access to Work to be tested.
2. To obtain and handle samples at the site or at source of products to be tested.
3. To facilitate tests.
4. To provide storage and curing of test samples.

D. Notify Engineer and laboratory 48 hours prior to expected time for operations requiring testing services.

E. Employ services of an independent qualified testing laboratory and pay for additional samples and tests required by Contractor beyond specified requirements.

1.11 SCHEDULE OF TESTS

A. Below is a schedule of tests for the civil work. Tests related to building are elsewhere.

Section	Test	Frequency	Date	Performed By	Notes
03 30 00 – Cast-in-Place Concrete					
	Materials	As necessary			
	Mix Designs	1 per mix design			
	Strength	4 Test Cylinders for each 50 cy or less or each mix design placed daily			
	Slump	1 test per each set of cylinders			
	Air Content	1 test per each set of cylinders			
	Temperature	1 test per each set of cylinders			
31 00 00 – Earthwork					
	Compaction				
	Unpaved	1 test per horizontal layer per 10,000 sf of fill area			
	Paved	1 test per horizontal layer per 5,000 sf of subgrade			
	Building Pad	1 test per horizontal layer per 1,500 sf of fill area			
	Proof Rolling	As necessary			
32 11 23 – Aggregate Base Courses					
	Base Density	1 test per 5,000 sf			
32 12 16 – Asphalt Paving					
	Asphalt Extraction & Gradation	1 test for each 250 tons placed			
	Marshall Stability	1 test for each 250 tons placed			
	Field Density	1 test for each 250 tons placed			
	Cores	1 test for each 250 tons placed			

Water Utilities					
	Hydrostatic & Leakage	1.5 times the working pressure (no less than 150 psi). Conducted for 2 hours with maintained pressure of 150 psi (200 psi on fire main)			
	Bacteriological Samples	2 taken 24 hours apart after disinfection			
	Compaction				
	Traffic Areas	1 per 100 lf or less for each 4 ft. of depth			
	Non–Traffic Areas	1 per 500 lf or less for each 4 ft. of depth			
	Fire Flow	1 per permit			
Sanitary Sewage Utilities					
	Television Inspection of Sewers	As requested			
	Leakage	As necessary			
	Compaction				
	Traffic Areas	1 per 100 lf or less for each 4 ft. of depth			
	Non–Traffic Areas	1 per 500 lf or less for each 6 ft. of depth			
	Gravity – Air	All lines			
	Hydrostatic – Force Main	100 psi for 2 hours			
	Deflection	100% of the system			
Storm Drainage Utilities					
	Compaction				
	Traffic Areas	1 per 100 lf or less for each 4 ft. of depth			
	Non–Traffic	1 per 500 lf or less for each 6 ft. of depth			

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

INDEX TO

SECTION 01 50 00

TEMPORARY CONSTRUCTION FACILITIES

SECTION 01 50 00

TEMPORARY CONSTRUCTION FACILITIES

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Site Plan

1. The Contractor shall prepare a site plan indicating the proposed location and dimensions of any area to be fenced and used by the Contractor, the number of trailers to be used, avenues of ingress or egress to the fenced area and details of the fence installation. Any areas which may have to be graveled to prevent the tracking of mud shall also be identified. The Contractor shall also indicate if the use of a supplemental or other staging area is desired.

B. Identification of Employees

1. The Contractor shall be responsible for obtaining badge for each employee through DOD, and for requiring each employee engaged on the work to display, identification as approved and directed by the ANG and the Owner. Prescribed identification shall immediately be delivered to the ANG security office for cancellation upon release of any employee. When required, the Contractor shall obtain and provide fingerprints of persons employed on the project. Contractor and subcontractor personnel shall wear identifying markings on hard hats clearly identifying the company for whom the employee works. All personnel shall have DOD badges and vehicle passes or decals to enter the ANG installation. Badges will be required to be worn at all times while on the installation.

C. Employee Parking

1. Contractor employees shall park privately owned vehicles in an area designated by the City and ANG. Contractor employee parking shall not interfere with existing and established parking requirements of the ANG installation.

1.02 AVAILABILITY AND USE OF UTILITY SERVICES

A. Payment for Utility Services

1. The amount of each utility service consumed shall be charged to or paid for by the Contractor. There shall be no additional cost to the Owner.

B. Meters and Temporary Connections

1. The Contractor, at its expense and in a manner satisfactory to the Owner, shall provide and maintain necessary temporary connections, distribution lines, and meter bases required to measure the amount of each utility used for the purpose of determining charges.

C. Sanitation

1. The Contractor shall provide and maintain within the construction area minimum field-type sanitary facilities approved by the Owner. Owner toilet facilities will not be available to Contractor's personnel.

D. Telephone

1. The Contractor shall make arrangements and pay all costs for telephone facilities desired.

1.03 PROTECTION AND MAINTENANCE OF TRAFFIC

A. During construction the Contractor shall provide access and temporary relocated roads as necessary to maintain traffic. The Contractor shall maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Owner. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, shall be as required by the State and local authorities having jurisdiction. The traveling public shall be protected from damage to person and property. The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with public traffic. The Contractor shall investigate the adequacy of existing roads and the allowable load limit on these roads. The Contractor shall be responsible for the repair of any damage to roads caused by construction operations. Any changes in traffic patterns or restrictions shall be approved by the ANG.

B. Barricades

1. The Contractor shall erect and maintain temporary barricades to limit public access to hazardous areas. Such barricades shall be required whenever safe public access to paved areas such as roads, parking areas, or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Barricades shall be securely placed, clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

1.04 CONTRACTOR'S TEMPORARY FACILITIES

A. Administrative Field Offices

1. The Contractor shall provide and maintain administrative field office facilities within the construction area at the designated site for his **superintendent, and a dedicated office trailer for the City inspectors, and the Engineer.** Office shall be located where it will not interfere with the progress of the work nor the Owners existing operations.

B. Storage Area

1. The ANG provided a temporary storage area for the duration of construction as indicated in Section 01 30 00. The Contractor shall construct a temporary six-foot high chain link fence around the temporary storage area and materials as required by the ANG. The fence shall include plastic strip inserts, colored brown, so that visibility through the fence is obstructed. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit.

C. Appearance of Trailers

1. Trailers utilized by the Contractor for administrative or material storage purposes shall present a clean and neat exterior appearance and shall be in a state of good repair. Trailers which, in the opinion of the Owner, require exterior painting or maintenance will not be allowed on the property.

D. Maintenance of Storage Area

1. Fencing shall be kept in a state of good repair and proper alignment. Should the Contractor elect to traverse, with construction equipment or other vehicles, grassed or unpaved areas which are not established roadways, such areas shall be covered with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways; gravel gradation shall be at the Contractor's discretion. Grass located within the boundaries of the construction site shall be mowed for the duration of the project. Grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers shall be edged or trimmed neatly.

E. Security Provisions

1. Even though the site is located with the ANG, however, the contractor shall provide adequate security provisions at the temporary storage facilities. The Contractor shall be responsible for the security of its own equipment; in addition, the Contractor shall notify the ANG security staff requesting periodic security checks of the temporary storage facility.

F. Sanitary and Waste Disposal Facilities

1. The Contractor shall provide sanitary facilities for their workers, Owner, Engineer, visitors, and applicable regulatory personnel. Provide waste collections containers to handle waste from construction personal and operations.

1.05 TEMPORARY PROJECT SAFETY FENCING

A. As soon as practicable, but not later than 15 days after the date established for commencement of work, the Contractor shall furnish and erect temporary project safety fencing at the work site. The safety fencing shall be a high visibility

orange colored, high density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on maximum 10-foot centers, constructed at the approved location. The safety fencing shall be maintained by the Contractor during the life of the contract and, upon completion and acceptance of the work, shall become the property of the Contractor and shall be removed from the work site.

1.06 TEMPORARY FIRE PROTECTION

A. Install and maintain temporary fire-protections facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with Fire Department requirements.

B. Prohibit smoking in construction areas.

C. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.

D. Develop and supervise an overall fire-prevention and protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

E. Provide temporary fire protection suitable to the fire department.

1.07 PROTECTION

A. Contractor is responsible to provide such covering, shields, and barricades as are required to protect building occupants, equipment, stores, supplies, etc., from dust, debris, weather intrusion, water, moisture, or other cause of damage resulting from construction.

1.08 CLEANUP

A. Construction debris, waste materials, packaging material, and the like shall be removed from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways shall be cleaned away. Materials resulting from demolition activities which are salvageable shall be stored within the fenced area described above or at the supplemental storage area. Stored material not in trailers, whether new or salvaged, shall be neatly stacked when stored.

1.09 RESTORATION OF STORAGE AREA

A. Upon completion of the project and after removal of trailers, materials, and equipment from within the fenced area, the fence shall be removed and will become the property of the Contractor. Areas used by the Contractor for the storage of equipment or material, or other use, shall be restored to the original or better condition. Gravel used to traverse grassed areas shall be removed and the area restored to its original condition, including top soil and seeding as necessary.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

INDEX TO

SECTION 01 56 39

TEMPORARY TREE AND PLANT PROTECTION

SECTION 01 56 39

TEMPORARY TREE AND PLANT PROTECTION

PART 1 – GENERAL

1.01 QUALITY ASSURANCE

A. Contractor shall provide at least one person who shall be present at all times during planting and pruning. Individual shall be thoroughly familiar with types of plants and trees involved and shall be responsible for directing the digging, cutting, planting, and maintenance of designated plant and tree materials.

B. Qualifications: Repair of tree damage shall be completed or supervised by a tree surgeon who is a member of the National Arborist Association.

C. Pre–Work Conference – Review on site with the Owner.

D. **Trees to be removed will be marked with green flagging. Trees to remain will be marked with red flagging. Trees designated as "SPECIMEN" will be marked with yellow flagging.**

PART 2 – PRODUCTS

2.01 MATERIALS

A. Provide tree protection materials, as detailed on the construction drawings.

PART 3 – EXECUTION

3.01 PROTECTION OF SPECIMEN TREES

A. Any irreparable damage to roots, trunk or bark, or any unauthorized cutting or pruning of limbs to trees designated by the Owner as "specimen" will result in a fine. This fine shall be levied through the Application for Payment as retainage and shall be used to supplement "specimen" with tree of similar value and to perform extensive "state of the art" tree surgery in an attempt to save the tree.

3.02 METHODS OF PROTECTION

A. Use the following method to protect specimen trees. Actual determination of extent and combination of methods shall be determined on site.

B. Temporary Fence Enclosures: Construct protective fencing where indicated on the construction drawings. Protective fencing shall be installed a minimum of three feet beyond the dripline. No grading, trenching, pruning, or storage of materials shall be allowed inside this area.

3.03 REPAIR OF TREES INJURED DURING CONSTRUCTION

A. Contractor shall:

1. Repair damaged trees promptly to prevent progressive deterioration caused by damage.

2. Repair to trees damaged during construction according to standard arborcultural techniques recognized by International Society of Arborculture.

3. Remove trees damaged beyond satisfactory repair as determined by Owner. Refer to FINES AND MITIGATION in this section for loss of specimen trees.

4. Temporarily cover roots exposed during construction with wet burlap to prevent roots from drying out. Cover roots with earth as soon as possible.

5. Roots Cut During Construction: Coat roots 1 1/2 inches diameter or larger with antiseptic paint.

3.04 FINES

A. Fine values for designated **"SPECIMEN"** vegetation shall be determined by the following:

Caliper	Fine
1 inch – 2 inches	$ 150.00
2 inches – 3 inches	$ 200.00
3 inches – 4 inches	$ 250.00
4 inches – 5 inches	$ 400.00
5 inches – 6 inches	$ 500.00
6 inches – 7 inches	$ 600.00
7 inches – 8 inches	$ 750.00
8 inches – 11 inches	$ 1,500.00
12 inches – 20 inches	$ 2,000.00
21 inches & larger	$ 2,500.00

3.05 MITIGATION

A. Mitigation shall be in the form of tree transplantation. Plant materials shall be from off–site (for smaller sites) or from remote areas on site. Trees shall be comparable in size, form, and species to lost "specimen" tree. Tree species, size, and planting locations shall be approved by the Owner.

END OF SECTION

INDEX TO

SECTION 01 65 00

SHIPMENT, PROTECTION, AND STORAGE

SECTION 01 65 00

SHIPMENT, PROTECTION, AND STORAGE

PART 1 – GENERAL

1.01 GENERAL

A. Equipment, products and materials shall be shipped, handled, stored, and installed in ways which will prevent damage to the items. Damaged items will not be permitted as part of the work except in cases of minor damage that have been satisfactorily repaired and are acceptable to the Owner and Engineer. Additional delivery, handling, and storage requirements, specific to an individual product, may be provided in the appropriate Specification sections.

1.02 TRANSPORATION AND DELIVERY

A. Transport and handle items in accordance with manufacturer's printed instructions.

B. Schedule delivery to reduce long term on-site storage prior to installation and operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer.

C. Ship equipment, materials, and spare parts complete except where partial disassembly is required by transportation regulations or for protection of components.

D. Pack spare parts in containers bearing labels clearly designating contents and pieces of equipment for which intended.

E. Deliver spare parts at time as pertaining equipment. Deliver spare parts to owner after completion of work.

F. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.

G. Deliver products to the site in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, packing, protecting and installing.

H. Assume responsibility for equipment material and spare parts just before unloading from carrier at site.

I. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.

J. Provide equipment and personnel to unload all items delivered to the site.

K. Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by others (i.e. Owner, other Contractors), perform inspection in the presence of the Engineer. Notify Engineer verbally, and in writing, of any problems

L. Pay all demurrage charges if failed to promptly unload items.

PART 2 – PRODUCTS

2.01 PIPE

A. Pipe and appurtenances shall be handled, stored, and installed as recommended by the manufacturer. Pipes with paint, tape coatings, linings, or the like shall be stored to protect the coating or lining from physical damage or other deterioration. Pipes shipped with interior bracing shall have the bracing removed only when recommended by the pipe manufacturer.

PART 3 – EXECUTION

3.01 EQUIPMENT

A. PACKAGE AND MARKING:

1. All equipment shall be protected against damage from moisture, dust, handling, or other cause during transport from manufacturer's premises to site. Each item or package shall be marked with the number unique to the specification reference covering the item.

2. Stiffeners shall be used where necessary to maintain shapes and to give rigidity. Parts of equipment shall be delivered in assembled or subassembled units where possible.

B. IDENTIFICATION:

1. Each item of equipment and valve shall have permanently affixed to it a label or tag with its equipment or valve number designated in this contract. Marker shall be of stainless steel. Location of label will be easily visible.

C. SHIPPING:

1. Bearing housings, vents, and other types of openings shall be wrapped or otherwise sealed to prevent contamination by grit and dirt.

2. Damage shall be corrected to conform to the requirements of the contract before the assembly is incorporated into the Work. The Contractor shall bear the costs arising out of dismantling, inspection, repair, and reassembly.

D. DELIVERY AND HANDLING:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.

2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to Project site in an undamaged, or sensitive to deterioration, theft, and other losses.

4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

E. FACTORY APPLIED COATINGS:

1. Unless otherwise specified, each item of equipment shall be shipped to the site of the Work with the manufacturer's shop applied epoxy prime coating. The prime coating shall be applied over clean dry surfaces in accordance with the coating manufacturer's recommendations. The prime coating will serve as a base for field-applied finish coats. Electrical equipment and materials shall be painted by manufacturer.

F. UNLOADING:

1. Unloaded and handle according to manufacturer's requirement. Contractor shall unload and store MBR manufacturer's equipment according to their instruction.

G. STORAGE:

1. During the interval between the delivery of equipment to the site and installation, all equipment, unless otherwise specified, shall be stored in an enclosed space affording protection from weather, dust, and mechanical damage and providing favorable temperature, humidity, and ventilation conditions to ensure against equipment deterioration. Manufacturer's recommendations shall be adhered to in addition to these requirements.

2. Equipment and materials to be located outdoors may be stored outdoors if protected against moisture condensation. Equipment shall be stored at least six inches above ground. Temporary power shall be provided to energize space heaters or other heat sources for control of moisture condensation. Space heaters or other heat sources shall be energized without disturbing the sealed enclosure.

   a. Store products to allow for inspection and measurement of quantity or counting of units.

   b. Store materials in a manner that will not endanger Project structure.

c. Store products that are subject to damage by the elements, under cover in a weather-tight enclosure above ground, with ventilation adequate to prevent condensation.

d. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

e. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.

f. Protect stored products from damage and liquids from freezing.

H. PROTECTION OF EQUIPMENT AFTER INSTALLATION:

1. After installation, all equipment shall be protected from damage from, including but not limited to, dust, abrasive particles, debris and dirt generated by the placement, chipping, sandblasting, cutting, finishing and grinding of new or existing concrete, terrazzo, and metal; and from the fumes, particulate matter, and splatter from welding, brazing, and painting of new or existing piping and equipment. As a minimum, vacuum cleaning, blowers with filters, protective shieldings, and other dust suppression methods will be required at all times to adequately protect all equipment. During concreting, including finishing, all equipment that may be affected by cement dust must be completely covered. During painting operations, all grease fittings and similar openings shall be covered to prevent the entry of paint. Electrical switchgear, unit substation, and motor load centers shall not be installed until after all concrete work and sand-blasting in those areas have been completed and accepted and the ventilation systems installed.

END OF SECTION

INDEX TO

SECTION 01 75 15

EQUIPMENT – START UP

SECTION 01 75 15

EQUIPMENT START UP

PART 1 - GENERAL

1.01 SUMMARY

A. The Contractor shall:

1. Coordinate a schedule for start-up of various equipment and systems.

2. Notify the Engineer ten working days prior to start-up of each item or station.

3. Make sure all piping, grit system, screens, MBR basins, wet wells, equipment, etc. are free of construction debris prior to starting pumps, blowers, and other equipment.

4. Verify that each piece of equipment or system had been checked for proper lubrication, drive rotation, belt tension, control sequence, blockage, or other conditions which may cause damage.

5. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

6. Verify wiring and support components for equipment are complete and tested.

7. Execute start-up under supervision of responsible Manufacturer's service technician, Utility representative, Engineer, and contractor's personnel in accordance with manufacturer's instructions and in accordance to **Section 01 78 23,** and **01 78 25.**

8. Submit a written report from the equipment service technician that all equipment or system had been properly installed and is functioning correctly.

1.02 DEMONSTRATION AND INSTRUCTION

A. In addition to the requirements of Section 1.01 above, the Contractor shall:

1. Demonstrate operation and maintenance of the system to the engineer and the plant personnel prior to final acceptance. The Contractor shall provide the equipment manufacturer's representative for a minimum of one day of training to Utility personnel for each station. The Contractor shall coordinate and schedule demonstration of the system with the Wastewater Division and the engineer according to Specification **01 79 00.**

2. Utilize operation and maintenance manuals as basis for instruction. Review contents on manual with Utility personnel in detail to explain all aspects of operation and maintenance.

3. Demonstrate start-up, operation, control adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at equipment location.

4. Prepare and insert additional data operations and maintenance manuals when need for additional data becomes apparent during instruction.

END OF SECTION

INDEX TO

SECTION 01 77 00

CLOSEOUT PROCEDURES

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Closeout procedures.

B. Project record documents.

C. Warranties and bonds.

D. Operation and maintenance data.

E. Maintenance services.

1.02 RELATED SECTIONS

A. Section 01 00 01 – General Requirements.

B. Section 01 99 90 – Reference Forms.

C. Section 01 78 36 - Warranties.

D. Section 01 78 33 - Bonds.

1.03 SUBSTANTIAL COMPLETION PROCEDURES

A. In addition to the requirements in the General Conditions, contractors shall follow these procedures.

1. Contractor's List of Incomplete Items:Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

2. Submittals Prior to Substantial Completion: Complete the following a minimum of ten days prior to requesting review for determining date of Substantial Completion. List items below that are incomplete at time of request.

a. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities.

b. Submit closeout submittals including but not limited to project record documents, operation and maintenance manuals, final completion construction photographic documentation, test results, and similar final record information.

c. Submit maintenance material submittals specified in individual section, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Engineer. Label with manufacturer's name and model number where applicable.

1. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.

3. Submit test, adjust, and balance records.

4. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

B. Procedures Prior to Substantial Completion: Complete the following a minimum of ten days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.

2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.

3. Complete startup and testing of systems and equipment.

4. Perform preventive maintenance on equipment used prior to Substantial Completion.

5. Engage responsible manufacturer to Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in individual equipment specifications.

6. Advise Owner of changeover in electric and other utilities.

7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.

8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

9. Remove labels that are not permanent labels.

10. Complete final cleaning requirements, including touch up painting.

11. Touch up and otherwise repair and restore marred exposed finished to eliminate visual defects.

1.04 CLOSEOUT PROCEDURES

A. Submit written verification that the Contract Documents had been reviewed, Work has been observed at appropriate times, and the Work is complete in accordance with Contract Documents and ready for Engineer's review. Request in writing that the Engineer review the work. Then address all punch lists or discrepancy items developed from Engineer, Owner, and State's review.

B. Submit a draft to Engineer of all closeout documents for review at least 15 days prior to substantial completion.

C. Submit project record documents (see item 1.05).

D. Provide closeout submittals to Engineer (see item 1.06).

E. Provide any other submittals to Engineer required by governing or other authorities.

F. Provide Final Adjustment of Accounts (see item 1.07).

G. Provide maintenance services indicated in specification sections for one year from the date of substantial completion.

H. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

I. Site and building shall be cleaned per specifications.

1.05 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; 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 instructions for assembly, installation, maintenance, and adjustments.

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

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

D. Record information concurrent with construction progress.

E. Equipment Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.

2. Product substitutions or alternates utilized.

3. Changes made by Addenda and modifications.

F. Project Record Drawings: Legibly mark each item to record actual construction including:

1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.

3. Where proposed and existing utilities cross, the Contractor shall measure and record the horizontal location and vertical separation between each crossing. Separation shall be measured between exteriors and pipes.

4. Field changes of dimension and detail.

5. Details not on original Contract drawings.

6. An as built of the construction with spot elevations and finished contours of the site plan and all storm pipes/inlets.

7. An as-built of the sanitary sewer, water and storm drainage systems.

8. Record drawings for building, conduits, structures, and electrical, power, communications and related.

9. Piling data locations, tip and cut-off elevations and driving records.

10. Building MEP and other building features (with changes).

G. Record drawing shall be prepared according to these conditions: The Contractor shall keep accurate, legible records of the locations, types, and sizes of sanitary lines, service laterals, manholes, cleanouts, water lines, fittings, valves, hydrants, drainage pipes, drainage structures, and other related work performed under this project. Where proposed and existing utilities cross, the Contractor shall measure and record the horizontal location and vertical separation between each crossing. Separation shall be measured between exteriors of pipes. On a set of project prints provided by the Owner, the Contractor shall prepare a set of "record" drawings from the data stated above. The horizontal locations of all portions of items installed on this project shall be accurately tied down to features that are physical and visible, such as property corner markers and permanent type structures. Invert elevations of all manholes, storm sewers and structures, sanitary sewers, and lift stations shall be clearly indicated. These

"record" drawings shall be kept clean and dry and maintained in a current state with the progress of the work. If at any time, a copy of this plan or portion of it is requested by the Owner, such copy shall be made available within 24 hours after the request is made.

Before final acceptance of the completed installation and final payment by the Owner, the Contractor shall deliver to the Engineer, three sets of "Record" Drawings accurately depicting the horizontal and vertical as–built data described in the above paragraph. "Record" drawings for the items installed on this project shall be certified by a licensed surveyor, other than Thomas & Hutton, registered in State of Georgia. The size of the drawings shall be 24" x 36". The "Record" drawings shall have a coordinate system based on the South Carolina State Plane Coordinate System, East Zone, North American Datum of 1983 (NAD83). Elevations shall be based on the North American Vertical Datum of 1929 (NGVD 29). All measurements and coordinates shown shall use the U.S. Survey flood definition. Coordinates shall be shown on all drainage storm manholes/boxes and all other related work performed under this contract, including an as built condition of all underground piping, manholes, valve boxes, storm drainage certified by a registered surveyor with spot elevations and finished 1-foot contours. Vertical data including but not limited to, structure and manhole frame and inverts, pipe inverts, control levels, bottom, site grading, and as-built grading shall be shown. In addition to the "Record" drawings, Contractor shall deliver to Engineer electronic AutoCAD (v. 14 or later) files of all the data described above on a CD-ROM.

H. Deliver final project record drawing files to Engineer in an electronic AutoCAD (v.14 or later) and three paper sets. Find project record drawing shall include Engineer comments and shall conform to regulatory agency requirements.

I. Submit final documents to Engineer at least 15 days prior to claim for final Application for Payment.

1.06 CONTRACTOR'S CLOSEOUT SUBMITTAL TO ENGINEER

A. Closure of the construction contract, including final payment to the Contractor, requires the following:

1. Contractor's submission to the Engineer of the following:

a. Project record drawings.

b. An affidavit, in the form of the AIA G706, that wages, bills for materials and equipment, and other indebtedness connected with the work have been paid (Contractor's affidavit of payment & debt and claims);

c. A certificate in the form of AIA G715 (Accord for Certificate of Insurance) issued by an authorized representative of the Contractor's insurance company certifying completed project insurance coverage as required by the contract documents;

d. A statement that the Contractor knows of no reason that the completed project insurance will not be renewable to cover the period required by the Contract Documents;

e. Consent of surety, if any, to final payment, in the form of AIA G707 (Consent of Surety to Final Payment);

f. Other information required by the Owner establishing the Contractor's payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims and security interests arising out of the contract, all in the forms as designated by the Owner;

g. Inspection reports that may not be a part of the record documents;

h. All warranties and quantities;

i. O&M Manuals;

j. Training Manuals;

k. Final Adjustment of Accounts; and

l. A list of all claims against Owner that the Contractor believes is unsettled.

m. Other documents required by the Owner and State guidelines and requirements,

1.07 FINAL ADJUSTMENT OF ACCOUNT

A. Submit a final statement of accounting to the Engineer.

B. Statement shall reflect all adjustments to the contract sum:

1. The original contract sums

2. Additions and deductions resulting from:

a. Previous change orders;

b. Unit prices;

c. Penalties and bonuses;

d. Deductions for liquidated damage; and

e. Other adjustments.

3. Total contract sum, as adjusted.

4. Previous payments.

5. Remaining sum due.

1.08 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

1.09 OPERATION AND MAINTENANCE DATA

A. Submit as directed in Section 01 78 23 Operating and Maintenance Information.

1.10 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Provide spare parts, maintenance, and extra Products in quantities specified in individual specification sections.

B. Deliver to location as directed; obtain receipt prior to final payment.

C. Crate in containers designed for prolonged storage suitable for handling with hoisting equipment containers.

D. Stencil contents on containers

1.11 WARRANTIES AND BONDS

A. Provide duplicate notarized copies and a PDF of each.

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

C. Provide Table of Contents and assemble in three D side ring binder with durable plastic cover.

D. Submit prior to final Application for Payment.

E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.12 MAINTENANCE SERVICE

A. The general contractor, as part of his contract, shall engage the manufacturer representative of the major equipment to return to the site for one visit to perform the first-year maintenance and inspection. The contractor is responsible to schedule, monitor, and furnish this service. This shall include, pumps, blowers, screens, MBR equipment, UV, DO system, generator, electrical valves, and chemical system.

B. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

D. Maintenance service shall not be assigned or transferred to any agent or Subcontractor without prior written consent of the Owner.

1.13 FINAL CLEANING

A. Execute final cleanup prior to final project acceptance.

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

C. Clean all exterior paved surfaces, establish vegetation or ground cover on all disturbed areas.

D. Clean all sight-exposed interior and exterior surfaces and work areas.

E. Clean all windows, glasses, floors, monitors, cabinets, controls, etc.

F. Clean debris and sediment from all new storm pipes and structures.

G. Repair all cracked or damaged curbs, sidewalks and concrete areas. If the crack is irregular or goes through the full depth of the concrete, remove the damaged section and replace.

H. Removal all soil and other debris from the new storm system, curb, and paved areas.

I. Comply with requirements of Section 01 77 01.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

INDEX TO

SECTION 01 77 01

CLEANING

SECTION 01 77 01

CLEANING

PART 1 – GENERAL

1.01 RELATED SECTIONS

A. Documents affecting the work of this Section include, but are not necessarily limited to, the General Conditions, the Supplementary Conditions, and other Sections in Division 1 of these Specifications.

B. In addition to standard described in this Section, comply with requirements for cleaning as described in pertinent other Sections of these Specifications.

1.02 DESCRIPTION OF WORK INCLUDED

A. Throughout the construction period, maintain the buildings and site in a standard of cleanliness as described in this Section.

B. Execute cleaning during progress of the work and at completion of the work.

1.03 QUALITY ASSURANCE

A. Conduct daily inspection, and more often if necessary, to verify that requirements for cleanliness are being met.

B. In addition to the standards described in this Section, comply with pertinent requirements of governmental agencies having jurisdiction.

C. Conduct cleaning and disposal operations to comply with all Federal, State, and local codes, ordinances, regulations, and anti-pollution laws.

PART 2 – PRODUCTS

2.01 CLEANING MATERIALS AND EQUIPMENT

A. Provide required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

B. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.

C. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.

D. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

2.02 COMPATIBILITY

A. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

PART 3 – EXECUTION

3.01 PROGRESS CLEANING

A. General

1. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing protection of materials.

2. Do not allow accumulation of scrap, debris, waste material, and other items not required for construction of the work.

3. At least twice each month, and more often if necessary, completely remove all scrap, debris, and waste material from the job site.

4. Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the environment.

5. Execute periodic cleaning to keep the work, the site and adjacent properties free from accumulation of waste materials, rubbish, and wind-blow debris, resulting from construction operations.

B. Site

1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.

2. Weekly, and more often it necessary, inspect all arrangements of materials stored on the site. Restack, tidy, or otherwise service arrangements to meet the requirements of paragraph 3.01, part A, Section 1.

3. Maintain the site in a neat and orderly condition at all times.

4. Provide onsite containers for the collection of waste materials, debris and rubbish. Empty as necessary to prevent overflow and nuisance odor.

C. Structures

1. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.

2. Weekly, and more often if necessary, sweep interior spaces clean ("Clean", for the purpose of this subparagraph shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and a hand-held broom).

3. As required preparatory to installation of succeeding materials, clean the structures of pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the necessary cleanliness.

4. Following the installation of finish floor materials, clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which materials are installed *("Clean", for the purpose of this paragraph, shall be interpreted as meaning free from foreign material which, in the opinion of the Architect or Engineer, may be injurious to the finish floor material).*

3.02 DUST CONTROL

A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.

B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

C. Control dust on the site through the use of watering trucks and other accepted means.

3.03 FINAL CLEANING

A. Execute final cleanup prior to final project acceptance.

B. "Clean", for the purpose of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.

C. Prior to completion of the work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in Article 3.01.

D. Site

1. Clean project site, yard and grounds disturbed by construction activities. Unless otherwise specifically directed by the Architect or Engineer, broom clean paved areas on the site and public paved areas adjacent to the site and rake clean other surfaces of the grounds. Remove stains, spills, and other foreign deposits.

2. Completely remove resultant debris.

E. Structures

1. Exterior

a. Visually inspect exterior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.

b. Remove all traces of splashed materials from adjacent surfaces.

c. If necessary to achieve a uniform degree of cleanliness, hose down the exterior of the structure.

d. In the event of stubborn stains not removable with water, the Architect or Engineer may require light sandblasting or other cleaning at no additional cost to the Owner.

2. Interior

a. Visually inspect interior surfaces and remove all traces of soil, waste materials, smudges and other foreign matter.

b. Remove all traces of splashed material from adjacent surfaces.

c. Remove paint droppings, spots, stains and dirt from finished surfaces.

3. Glass

a. Clean inside and outside

4. Polished surfaces

a. To surfaces requiring routine application of buffed polish, apply the polish recommended by the manufacturer of the material being polished.

5. Replace disposable air filters.

6. Clean ducts, blowers, coil units and HVAC.

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

G. Clean all exterior paved surfaces, establish vegetation or ground cover on all disturbed areas.

H. Clean all sight-exposed interior and exterior surfaces and work areas.

I. Clean debris and sediment from all new storm pipes and structures.

J. Repair all cracked or damaged curbs. If the crack is irregular or goes thru the full depth of the curb, remove the damaged section and replace.

K. Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

L. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations immediately prior to Occupancy for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

c. Rake grounds that are neither planted nor paved smooth, even-textured surface.

d. Remove tools, construction equipment, machinery, and surplus material from Project site.

e. Clean exposed exterior and interior finishes to a dirt-free condition, free of grease, dust, stains, films, fingerprints, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

g. Sweep concrete floors broom clean in unoccupied spaces.

h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.

i. Power scrub and power buff resilient flooring surfaces, tile, and fluid-applied flooring.

j. Clean transparent materials, including mirrors and glass in doors windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.

k. Remove labels that are not permanent.

l. Wipe surfaces of mechanical and electrical equipment, elevator equipment where applicable, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection. Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.

p. Clean lighting fixtures, lamps, globes, and reflectors to functions with full efficiency.

q. Leave Project clean and ready for occupancy.

M. Schedule final cleaning as approved by the Architect or Engineer to enable the Owner to accept a completely clean work.

N. Prior to final completion or Owner occupancy, Contractor shall conduct an inspection of sight-exposed interior and exterior surfaces and all work areas to verify that the entire work is clean.

3.04 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion and final cleaning.

B. Repair of remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repair or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.

2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.

a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

3.05 CLEANING DURING OWNER'S OCCUPANCY

A. Should the Owner occupy the work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning shall be as determined by the Architect or Engineer in accordance with the General Conditions of the Contract.

END OF SECTION

INDEX TO

SECTION 01 78 23

OPERATION AND MAINTENANCE INFORMATION

SECTION 01 78 23

OPERATING AND MAINTENANCE INFORMATION

PART 1 – GENERAL

1.01 SCOPE

A. Operation and maintenance (O&M) instructions shall be provided in accordance with this section and as required in the technical sections of this project manual. O&M information shall be provided for each maintainable piece of equipment, equipment assembly or subassembly, and material provided or modified under this contract.

B. O&M instructions must be submitted and accepted before on-site training may start.

PART 2 – INFORMATION

2.01 SUBMISSION OF OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance (O&M) Data specifically application to this contract and a complete and concise depiction of the provided equipment, product, or system. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit in accordance with this section. Provide hard and digital copies.

A. Package Quality

1. Documents must be fully legible. Poor quality copies and material with hole punches obliterating the text or drawings will not be accepted.

B. Package Content

1. Data package content shall be as shown in the paragraph titled "Schedule of Operation and Maintenance Data Packages." Comply with the data package requirements specified in the individual technical sections, including the content of the packages and addressing each product, component, and system designated for data package submission.

C. Changes to Submittals

1. Manufacturer-originated changes or revisions to submitted data shall be furnished by the Contractor if a component of an item is so affected subsequent to acceptance of the O&M Data. Changes, additions, or revisions required by the Engineer for final acceptance of submitted data, shall be submitted by the Contractor within ten calendar days of the notification of this change requirement.

2.02 TYPES OF INFORMATION REQUIRED

A. GENERAL:

1. O&M information shall contain the names, addresses, and telephone numbers of the manufacturer, the nearest representative of the manufacturer, and the nearest supplier of the manufacturer's equipment and parts. In addition, one or more of the following items of information shall be provided as applicable.

B. OPERATING INSTRUCTIONS:

1. Specific instructions, procedures, and illustrations shall be provided for the following phases of operations:

   a. SAFETY PRECAUTIONS: List personnel hazards for equipment and list safety precautions for all operating conditions.

   b. OPERATOR PRESTART: Provide requirements to set up and prepare each system for use.

   c. START-UP, SHUTDOWN, AND POST SHUTDOWN PROCEDURES: Provide a control sequence for each of these operations.

   d. NORMAL OPERATIONS: Provide control diagrams with data to explain operation and control of systems and specific equipment.

   e. EMERGENCY OPERATIONS: Provide emergency procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include emergency shutdown instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance on emergency operations of all utility systems including valve locations and portions of systems controlled.

   f. OPERATOR SERVICE REQUIREMENTS: Provide instructions for services to be performed by the operator such as lubrication, adjustments, and inspection.

   g. ENVIRONMENTAL CONDITIONS: Provide a list of environmental conditions (temperature, humidity, and other relevant data) which are best suited for each product or piece of equipment and describe conditions under which equipment should not be allowed to run.

C. PREVENTIVE MAINTENANCE:

1. The following information shall be provided for preventive and scheduled maintenance to minimize corrective maintenance and repair:

a. LUBRICATION DATA: Provide lubrication data, other than instructions for lubrication, in accordance with paragraph 2.02-B.1. f.

1. A table showing recommended lubricants for specific temperature ranges and applications;

2. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities; and

3. A lubrication schedule showing service interval frequency.

2. PREVENTIVE MAINTENANCE PLAN AND SCHEDULE: Provide manufacturer's schedule for routine preventive maintenance, inspections, tests, and adjustments required to ensure proper and economical operation and to minimize corrective maintenance and repair. Provide manufacturer's projection of preventive maintenance man-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft.

D. CORRECTIVE MAINTENANCE:

Manufacturer's recommendations shall be provided on procedures and instructions for correcting problems and making repairs.

1. TROUBLESHOOTING GUIDES AND DIAGNOSTIC TECHNIQUES: Provide step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

2. WIRING DIAGRAMS AND CONTROL DIAGRAMS: Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job-specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type identically to actual installation numbering.

3. MAINTENANCE AND REPAIR PROCEDURES: Provide instructions and list tools required to restore product or equipment to proper condition or operating standards.

4. REMOVAL AND REPLACEMENT INSTRUCTIONS: Provide step-by-step procedures and list required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings, and adjustments required. Instructions shall include a combination of test and illustrations.

5. SPARE PARTS AND SUPPLY LISTS: Provide lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonably delays. Special consideration is required for

facilities at remote locations. List spare parts and supplies that have a long lead time to obtain.

6. CORRECTIVE MAINTENANCE MANHOURS: Provide manufacturer's projection of corrective maintenance man-hours including craft requirements by type of craft. Corrective maintenance that requires participation of the equipment manufacturer shall be identified and tabulated separately.

E. APPENDICES:

1. The following information shall be provided; include information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment.

   a. PARTS IDENTIFICATION: Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number which will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies.

   b. WARRANTY INFORMATION: List and explain the various warranties and include the servicing and technical precautions prescribed by the manufacturers or contract documents to keep warranties in force.

   c. PERSONNEL TRAINING REQUIREMENTS: Provide information available from the manufacturers to use in training designated personnel to operate and maintain the equipment and systems properly.

   d. TESTING EQUIPMENT AND SPECIAL TOOL INFORMATION: Provide information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.

   e. CONTRACTOR INFORMATION: Provide a list that includes the name, address, and telephone number of the General Contractor and each Subcontractor who installed the product or equipment, or system. For each item, also provide the name, address, and telephone number of the manufacturer's representative and service organization most convenient to the project site. Provide the name, address, and telephone number of the product, equipment, and system manufacturers.

PART 3 – EXECUTION

3.01 TRANSMITTAL PROCEDURE

A. Unless otherwise specified, O&M manuals, information, and data shall be submitted as follows:

1. Submit one draft copy of completed volumes 30 days prior to final walk through. This copy will be reviewed and returned after final inspection, with Engineer comments. Only complete sets of O&M instructions will be reviewed for acceptance. Revise content of all document sets as required prior to final submission.

2. Submit five (confirm with Owner and Engineer final number required prior to submittal) hard copies of revised final volumes and one electronic PDF copy (CD) within ten days of conducting the final walk through.

3. Hard copies shall be submitted in commercial quality, durable, D-ring binders.

B. For ease of identification, each manufacturer's brochure and manual shall be appropriately labeled with the equipment name and equipment number as it appears in the project manual. The information shall be organized in the binders in numerical order by the equipment numbers assigned in the project manual. The binders shall be provided with a table of contents and tab sheets to permit easy location of desired information.

C. If manufacturers' standard brochures and manuals are used to describe O&M procedures, such brochures and manuals shall be modified to reflect only the model or series of equipment used on this project. Extraneous material shall be crossed out neatly or otherwise annotated or eliminated.

END OF SECTION

INDEX TO

SECTION 01 78 25

PLANT TESTING, STARTUP, AND COMMISSIONING

SECTION 01 78 25

PLANT TESTING, STARTUP, AND COMMISSIONING

PART 1 – GENERAL

1.01 DESCRIPTION

A. Provide planning, functional completion testing, startup and commissioning as indicated and specified. Section includes:

1. Plant Checkout Plan.
2. Functional Completion Testing.
3. Startup.
4. Commissioning.
5. Performance Testing.

1.02 REFERENCES

A. American National Standards Institute (ANSI):

1. B31.1: Power Piping Code.

B. American Water Works Association (AWWA):

1. C600: Installation of Ductile-Iron Water Mains and Their Appurtenances.

1.03 DEFINITIONS

A. The Plant Checkout Plan (the Plan) incorporates all aspects of functional completion testing, startup, commissioning, performance testing, training, and reliability tests to ensure the facility operates properly and meets design intent and performance.

B. Functional Completion Testing is testing of the equipment and unit process systems to confirm that construction and installation has been completed in anticipation of initial startup of the equipment and unit process systems. Functional Completion Testing includes:

1. Physical Checkout shall be defined as the process of physically inspecting products after they have been installed in the Work to determine if the Products have been properly and completely installed and are ready for startup.
2. Functional Completion Testing shall be defined as testing that is performed by the Contractor, with Supplier or manufacturer certified technician, on

Products after they have been installed in the Work, and after the performance of physical checkout, for proving that the tested Products meet the requirements of the pertinent technical specifications. Administrative, test criteria, and minimum technical requirements for field testing are specified in Paragraph 1.08 of this Section.

C. Startup (clean water) shall be defined as the operation of equipment or unit process systems using clean water, air, or other fluids and gases as necessary to demonstrate the operation of the equipment or unit process systems with other equipment that is a part of, or a treatment process for the Facility. Administrative and minimum technical requirements for startup are specified in Paragraph 1.09 of this Section. **(Based on MBR process this may take up to 20 days).**

D. Commissioning shall be defined as the operation of equipment of unit process systems using wastewater, process liquids or process solids, plant support equipment, and plant utilities to demonstrate equipment or unit process systems are capable of processing water or wastewater at specified flows and conditions for a sustained period of operation as required by this section or equipment or unit process systems are ready to begin Performance Testing. Administrative and minimum technical requirements for Commissioning are specified in Paragraph 1.10 of this Section **(Based on MBR process this may take up to 120 days).**

E. Performance Testing is defined as a test to demonstrate the specified output of the equipment and unit process systems while maintaining regulatory compliance with Federal, State, and Local government regulations and minimum compliance with the equipment or unit process systems performance requirements and guarantees. **(Based on MBR process this may take up to 30 days).**

F. The Testing and Startup Coordinator shall be defined as the person provided by the Contractor to coordinate and oversee the total spectrum of testing and inspection activities required by the Contract Documents. The Testing and Startup Coordinator shall have been in responsible charge of at least two similar Projects in the last four years.

G. Startup Coordinator shall be the primary contact to execute the Plant check out plan.

1.04 ROLES AND RESPONSIBILITES

A. The Contractor shall provide all outside services, materials, labor, chemicals, supplies, test equipment and other items necessary to perform the Testing, Startup and Commissioning specified herein. In addition, the Contractor shall arrange for and provide the participation or assistance of quality control technicians, Supplier's or manufacturer technical representative(s), and required governmental agency representatives, as necessary.

B. The Contractor shall provide the services of a certified plant operator who is familiar with the MBR operation to conduct the plant start-up and commissioning. Manufacturer's representative(s) for every component to include, influent pumps, influent screens, grit removal systems, EQ mixers and pump station, MBR system, MBT system, chemical system, solids separation system (belt press, polymer feed, sludge

transfer pump, dry sludge pump, etc.), UV system. D.O system, drain pump station, meters, samplers, Reuse pumping system station, actuating valve, generator, and effluent pumps and control shall be on site during the following tasks:

1. Preliminary Equipment Checks and Field Testing.
2. Clean Water Testing of Membranes (Closed Loop)
3. Plant Wide Clean Water Testing (Closed Loop)
4. MBR Seeding and Introduction of Wastewater
5. Startup and MLSS Concentrations.
6. Commissioning
7. Final Performance Testing

C. The Supplier's technical representative's activities required by this Section are in addition to the requirements for vendor training and other services specified elsewhere in the Contract Documents. Timing for the performance of these services is to be defined in the Contractors Plant Checkout Plan.

D. The Engineer will review and comment on the Contractor's deliverables, observe the physical activities, the shop and field testing, witness functional testing, and maintain the permanent record of all testing results, and provide verification of conformance to the specifications. The Engineer's right to review work, witness tests or monitor or assess the Work and activities does not relieve the Contractor of its obligation to comply with the requirements of the Contract Documents nor does it imply completion of the Work.

1.05 SUBMITTALS

A. Submit the following shop drawings.

1. Submit a Plant Checkout Plan for the facility, with a listing of tests, activities, and an associated timeline.

B. Qualification Data:

1. Submit resumes for each team member proposed for testing, startup, and commissioning.

a. Include a minimum of three startup and commissioning references including: project name, project location, contact person's name, contact person's telephone number, contact persons role during the project, dates of startup, and commissioning.

1.06 QUALITY ASSURANCE

A. Preparation of the plant checkout plan, functional completion testing, and startup and commissioning shall be performed by personnel:

1. Trained and experienced in O&M of the described equipment.

2. Familiar with the treatment or unit process.

1.07 PLANT CHECKOUT PLAN

A. The Contractor shall be responsible for preparing, coordinating, and executing the Plan.

1. The Contractor shall use the resources of the equipment and unit process systems suppliers in this work, particularly for specific equipment and unit process systems.

2. An initial draft of the Plan shall be submitted as indicated here:

a. The initial draft of the Plant Checkout Plan shall be completed and submitted by the Contractor to the Engineer for review. The Engineer will require at least 15 days to review the submittal and return with any comments.

b. The Contractor shall incorporate the Engineer's comments into the revised Plan within 15 days of the receiving comments and reissue the Plan to the Engineer and Owner.

c. The Contractor shall regularly schedule meetings with the Engineer and Owner to review and coordinate activities required by the Plan.

B. The Contractor shall provide a dedicated field staff to support the Plan activities. A Startup Coordinator shall be responsible for day to day activities and shall be the primary contact with the Engineer regarding Plan activities. Support staff shall include, but not be limited to designated mechanical, electrical and instrumentation and control engineers and technicians, and operating staff.

1. The Contractor must engage a **certified plant operator** for oversight during start-up, testing, and plant commissioning. The City's staff will be present to learn about the plant in commissioning and witnessing performance testing activities specified herein.

a. The Contractor may require assistance of Owner's operating maintenance staff in witnessing the performance testing activities, at the convenience of the Owner.

b. These activities shall be incorporated in the Plan in defining responsibilities of the Plan participants.

C. The Plant Checkout Plan shall define:

1. The logical and systematic performance of physical inspections, field and functional tests, startup, commissioning, and performance testing including:

a. A chronological schedule of all testing and inspection activities.

b. A checklist of all inspection and testing activities broken down by location, discipline, system, and device or item.

c. All blank forms proposed by the Contractor for verification or recording of the functional completion testing, startup, commissioning and performance testing.

d. An index which cross references the forms to their intended application(s).

e. A list of all suppliers' certifications, including those required by the applicable technical specifications. Provisions shall also be included for retesting, in the event it is required.

2. A list of participants in functional completion testing, startup, commissioning, and subsequent performance testing.

3. A list of special test equipment required for functional testing, startup, commissioning, and performance testing.

4. Sources of the test media (wastewater, water, power, air, etc.) for functional completion testing.

5. The proposed method of delivery of the media to the equipment to be tested during functional completion testing, startup, commissioning, and performance testing.

6. Temporary or interim connections for the sequencing of multiple units during functional completion testing, startup, commissioning, and performance testing.

7. Ultimate disposal of the test media after functional completion testing, startup, commissioning, and performance testing.

D. The Plant checkout plan shall be reviewed by the Engineer and Owner, modified or revised as necessary by the Contractor, then re-reviewed by the Engineer. The Contractor shall continue to update the Plan, working in conjunction with the Engineer and Owner, prior to the start of the scheduled equipment checkout. Each specific element of the plan must receive opportunity for review or comment by the Owner, two weeks prior to the actual commencement of testing as defined herein.

E. The Contactor shall designate, in the Plan, a Startup Coordinator, to coordinate and manage the activities defined in the Plan.

1.08 FUNCTIONAL COMPLETION TESTING

A. Functional Completion Testing shall be completed as construction and installation of equipment is completed to demonstrate that the equipment is ready for equipment and unit process systems startup.

1. Functional Completion Testing shall be done in coordinated manner based on the Plant Checkout Plan prepared by the Contractor.

a. The Owner's operating and maintenance staff shall be allowed to observe for the purposes of familiarization and training.

b. Additional witnesses, such as the Engineer, may be present to represent the Owner.

2. Functional Completion Testing procedures and documentation forms shall be developed by the Contractor. The procedures shall include a listing of items inspected for Functional Completion Testing.

3. If any equipment or unit process systems do not meet Functional Completion Testing requirements, it shall be the responsibility of the Contractor to make the necessary corrections or replacements and repeat the test.

4. The equipment and unit process systems shall not be started up or put into service until the Functional Completion Testing is completed as evidenced by a completed Functional Completion Testing certificate for the equipment or subsystem.

5. Modifications to the equipment and unit process systems required to meet Functional Completion Testing requirements shall be provided by the contractor, and all retesting shall be performed at no additional cost to Owner.

6. A Functional Completion Testing Certificate form shall be prepared by the Contractor for each piece of equipment or unit process and submitted to the Engineer and Owner for review.

1.09 STARTUP (For more information on MBR Startup see Section 45 44 00)

A. Startup activities for the Facility shall not be initiated until the Functional Completion Testing is satisfactorily completed for the equipment or unit process systems.

B. The requirements of this section shall be satisfactorily completed prior to beginning Commissioning for the equipment and unit process systems.

C. The Contractor shall be responsible for startup.

1. The Owner's operating and maintenance staff shall be allowed to observe for the purposes of familiarization and training.

2. Additional witnesses, such as the Engineer, may be present to represent the Owner.

D. For equipment or unit process systems that do not meet the specified Startup requirements, it shall be the responsibility of the Contractor to make the necessary corrections or replacements and repeat Startup at no additional cost to the Owner.

E. Startup Reports for each piece of equipment or unit process shall be completed and submitted by the Contractor to the Engineer and Owner.

F. The Contractor shall not begin Commissioning until Startup certificate is completed and is submitted.

1.10 COMMISSIONING (For more information on MBR Commissioning see Section 45 44 00)

A. Commissioning activities for the Facility shall not be initiated until the requirements of Startup are completed for the equipment or unit process systems.

B. The requirements of this section shall be satisfactorily completed prior to beginning Performance Testing for equipment and unit process systems.

C. Commissioning shall be used by the Contractor and equipment or unit process suppliers to adjust, fine tune, modify, and prepare the equipment or system for continuous operation and Performance Testing as noted in Section 1.11.

1. Equipment shall not be operated without the guidance of qualified personnel having the knowledge and experience necessary to conduct proper operation thereof and obtain valid results.

2. All required adjustments, test, operation checks, and Startup and Commissioning activities shall be provided by qualified personnel.

3. Contractor shall be responsible for planning, supervising, and executing the Startup and Commissioning of the equipment and unit process systems with the assistance of equipment or unit process systems suppliers in accordance with the Plan.

D. The Contractor shall be responsible for Commissioning under the direction of its Startup Coordinator.

1. *The contractor is responsible for operation of the plant during commissioning and performance testing. The contractor shall engage a certified plant operator (approved by the MBR manufacturer) to operate the plant until the City acceptance of the system*

2. The contractor shall provide raw materials, chemicals, seed sludge, water, and utilities during testing, commissioning, and performance testing.

3. The Owner's operating and maintenance staff shall be allowed to observe for the purposes of familiarization and training.

4. Additional witnesses, such as the Engineer, may be present to represent the Owner.

E. For equipment or unit process systems that do not meet Commissioning requirements, it shall be the responsibility of the Contractor to make the necessary

corrections or replacements and repeat Commissioning and performance testing at no additional cost to the Owner.

F. The equipment or unit process systems shall not be Performance Tested or otherwise placed into service until Commissioning is completed as evidenced by a completed Commissioning certificate for the equipment or unit process systems.

G. Commissioning Certificates for each piece of equipment or unit process shall be completed and submitted by the Contractor, or manufacturer rep. to the Engineer and Owner.

1.11 PERFORMANCE TESTING (For more information on MBR Performance Testing see Section 45 44 00)

A. Performance Testing is defined as a test to demonstrate the specified output of the equipment and unit process systems while maintaining regulatory compliance with Federal, State, and Local government regulations and minimum compliance with the equipment or unit process systems performance requirements and guarantees for a minimum of thirty days.

B. During the performance testing, daily equal volume composite samples from the influent and effluent shall be obtained by the Contractor (or Owner if contractor makes prior arrangements for the owner to assist).

C. These samples will be for the measurement of the following parameters by the independent certified lab:
1. BOD_5.
2. TSS.
3. TKN.
4. NH_3-N.
5. TP as P
6. TN.
7. Flow.

D. The treated effluent shall meet these parameters:

Parameter	Effluent Limits
BOD_5	<5 mg/L
TSS	<5 mg/L
TKN	<10 mg/L
NH_3-N	<1 mg/L
TP as P	<0.5mg/L
TN	<10 mg/L
Fecal	200 (count/100 mL)

1.12 OPERATING PERIOD

A. Operating period is defined as a 30-day period that the Owner operates the plant while the contractor provides personnel which are available to answer questions, address operational issues and equipment malfunctions and adjustments, and similar items during the initial operating period.

PART 2 – PRODUCTS

Not used

PART 3 – EXECUTION

3.01 PLANT CHECKOUT PLAN

A. The Plan shall include the following items as a minimum:

1. Cover Sheet with Plant identification, title, date, and other information as needed to properly identify the specific information for the Facility.

2. Status and revisions sheet with appropriate dates and signatures spaces to document the development and status of the document.

3. Table of Contents including Appendix.

4. Equipment and systems descriptions with anticipated break down for individual startup activities. This section shall define the individual "packages" for startup activities for the equipment or unit process systems.

5. Schedule of events and other activities covered by the Plan.

   a. The schedule shall define dates for completing activities for equipment and unit process systems.

   b. The schedule shall be the Contactor's best estimate of time sequence at the time of issuance.

   c. The Contractor shall submit schedule updates to the Plan as necessary and at least monthly.

   d. The schedule shall follow the required sequencing as specified herein.

6. Sign-off sheets consisting of certification forms or completion reports required by the specifications shall be included in the Plan. Standard forms shall be developed by the Contractor for this purpose.

7. Reports, test results and other supporting data shall be collected by the Contractor for documentation of the specific details leading to the certification or completion.

B. Following shall be the sequence for completing functional completion testing, startup, commissioning, and performance testing activities required by the Plan.

1. Influent pump Station
2. Influent Screens
3. Grit Removal System
4. EQ Tank Mixer & Pump Station

5. MBR Process (see Section 45 50 00 for more information)
6. Digester and MBT
7. UV Disinfector
8. Drain pump station
9. Sludge Dewatering
10. Chemical feed system
11. Standby generator
12. D.O improvements
13. Effluent Pump Station system.

C. Any variation in the startup sequence deemed necessary by the Contractor shall be reviewed by the Engineer prior to changing the sequence.

3.02 FUNCTIONAL COMPLETION TESTING

A. Provide 15 working days written notice to the Engineer for each Functional Completion Test so that the Engineer may witness the functional completion tests. The Engineer may witness the performance of any or all Functional Completion Testing, at the Engineer's option.

B. Testing shall be conducted in accordance with the accepted Plan using applicable standard techniques reviewed by the Engineer and Owner.

1. Local and remote instrumentation may be used to record test data where it is determined the devices have been calibrated and are sufficient to obtain necessary data.

C. The Contractor shall develop standard data sheets to document Functional Completion Testing requirements have been met for all equipment and unit process systems included in the Plan.

1. As equipment testing is completed, the appropriate data sheet shall be completed and signed by the responsible party and submitted to the Engineer for review and acceptance.

2. Data values shall be stated in the engineering units noted in the equipment specifications.

D. A detailed Functional Completion Test plan shall be prepared and submitted to the Engineer for review and comment as noted paragraph 1.08 above.

1. The plan shall be prepared by the Contractor in conjunction with the equipment or subsystem supplier and shall become a part of the overall Plan.

E. In the event no reference to procedures is made, or no procedures for startup and commissioning are contained in a technical specification for the following test parameters, the following shall be the checkout requirements. Should their requirements conflict with the Supplier's recommendations or in any way be less stringent that the Supplier's requirements, they shall be superseded by the Supplier's requirements for checkout testing.

1. Measurement of wearing ring clearances for all pumps requiring assembly, so equipped:

   a. Take two readings taken opposed to each other by 90 degrees.

   b. All measured clearances shall be within Supplier's specifications for new installation. Replace and recheck rings found to be out of round or out of specified tolerance.

2. Measure of Impeller Bore for all pumps requiring assembly:

   a. Take two readings opposed to each other by 90 degrees.

   b. All measured clearances shall be within Supplier's specifications for new installation. Replace and recheck impellers found to be out of round or out of specified tolerance.

3. Measurement of shaft runout for all rotating equipment requiring assembly:

   a. Remove bearings from the shaft. Support shaft on pedestal rollers or in a lathe.

   b. Check each shoulder on the shaft.

   c. Take two readings for each shoulder, opposed to each other by 90 degrees.

   d. All measured clearances shall be within Supplier's specifications for new installations. Replace and recheck shafts found to be out of round or out of specified tolerance.

4. Vibration Measurements:

   a. Provide vibrational signature testing and documentation for each piece of direct drive or close coupled rotating equipment with a motor HP of 100 or above and a rated operating speed in excess of 1999 RPM.

   b. Unless specified otherwise, the current edition of the Hydraulic Institute Standard, "Acceptable Field Vibration Limits" shall be the standard for vibrational testing.

   c. Take all specified vibrational readings in three directions: vertical, horizontal, and axial.

   d. Provide vibrational measurements in the following engineering units:

      1. Displacement in thousandths of an inch (mils), peak to peak.

      2. Velocity in inches per second (ips), peak to peak.

3. Acceleration in feet per second per second (lg=32.3 ft. /sec. /sec.) zero to peak.

4. Spike energy in g-SE.

5. The vibrational readings shall be less than the device rotating frequency, and within the operating band specified by the Supplier.

6. Amplitude Allowable Maximums:

RPM	Amplitude inches peak to peak:
3,000 and above	0.001
1,500 – 2,999	0.002
1,000 – 1,499	0.0025
999 and below	0.003

5. Belt Drives:

a. All belts shall ride within the sheave and not slip to the groove(s).

b. Belt tension shall be in accordance with Supplier's recommendations.

c. Pulley alignment shall be within Supplier's recommendations.

6. Gear Drives and Reducers:

a. Check gears for lash at no less than three points around the gear.

b. Rotate gears a full 360 degrees while checking alignment.

7. Coupling/Shaft Alignment:

a. Perform all final alignments and checks with a dial indicator or a laser device. Feeler gauges and straight edges are not acceptable.

b. Eliminate soft foot conditions prior to aligning.

c. When checking for final soft foot, any displacement in excess of 0.002" must be corrected.

d. When checking for pipe strain, any displacement in excess of 0.002 inches requires piping realignment.

e. Alignments will not be regarded as final until the grout is set, and all piping has been attached. Demonstrate that alignment is not changeg by attachment of piping.

f. Shim the driving element, never the driven element.

g. Take bracket sag connections into account when using a dial indicator. Bracket sag shall be determined on a rigid pipe.

h. Mount a dial indicator to the driven element so that it can be rotated. Rotate both elements while aligning.

i. When aligning three coupled elements, align gear reduction elements with the driven element first, then align the driver to the gear reduction element.

j. Check all four alignments, i.e., angular alignment in the vertical and horizontal planes and parallel alignment in the vertical and horizontal planes.

k. The acceptable alignment accuracy for flexible couplings is +0.005 inches, or the Supplier's specifications, whichever is more stringent.

l. The dial indicators must be perpendicular to the alignment surface.

m. Number hold down nuts prior to tightening. Loosen in reverse order. Tighten in ascending order.

n. Use only clean, deburred shims. Clean the machine base and feet from rust or burrs prior to alignment.

8. Measure of Noise (dBA):

a. Eliminate noise sources generated by adjacent construction activity prior to testing.

b. Establish a background noise level prior to testing.

c. Perform noise level testing on each installed device as required by the technical specifications.

d. The maximum noise level exposure is 65 dBA over eight hours continuous for office, shop, and other areas where the Owner's personnel will be performing their duties.

e. The maximum noise level at five feet from the generator shall be 65 dBA.

9. Hydrostatic Testing:

a. AWWA C600 standards latest edition are the standards for all hydrostatic testing.

b. Visually inspect all welds prior to testing, for cracks, undercut on surface greater than 1/32-inches deep, lack of fusion on surface, reinforcement greater than Table 127.4.2 located in ANSI B31.1 Power Piping, and incomplete penetration (when accessible). Repair or rework as directed by the Engineer.

c. At no time during hydrostatic testing shall any part of the piping system be subjected to a stress greater than 90 percent of its yield strength at test temperature.

d. After ten minutes of full hydrostatic test pressures, make an examination for leakage of all joints, connections, and all regions of high stress, such as around openings and thickness transition sections.

e. Unless otherwise specified, the minimum required hydrostatic test pressure shall be one and a half times the design pressure as specified or 150 psi minimum or as indicated.

F. The Contractor shall furnish the service of an authorized, competent representative of the equipment or unit process supplier to supervise and coordinate the Functional Completion Testing program.

1. Instrument readings and other test data shall be tabulated by the Contractor.

G. Document Requirements:

1. Certificates are required for all Functional Completion Testing for equipment and unit process systems. Four copies of the completed certificates shall be supplied for review by the Engineer. Contents of the certificate shall be supplied for review by the Engineer. Contents of the certificate shall be at a minimum:

a. Contractor Review Comments and Approval Page. This page shall include Certification by the preparer that he or she is the person responsible for the test data and the data is authentic and accurate. This page shall include a listing and signature of all witnesses to the test.

b. Equipment Suppliers Review Comments and Approval Page. This page shall include Certification by the equipment or unit process systems suppliers that the equipment or unit process systems are properly installed and suitable for startup.

c. Process, Equipment, and P&ID's involved in this Functional Completion Test.

d. Schedule.

e. Test Descriptions/Procedures.

1. Equipment or unit process systems tested.
2. Test dates.
3. Electrical Inspection and Tests.
4. Test results.

5. Any repairs or corrections required to obtain acceptable test results.
6. Calibration sheet for instrumentation or devices used for testing but not part of plant installation.
7. Copies of calibration records for plant installed instrumentation.

f. Certify Mechanical Installation. Inspection and certification to be conducted by equipment representative. Inspect and certify that each piece of equipment meets the following requirements:

1. Not damaged in transportation or installation.
2. Properly installed with no undue force imposed from piping or supports.
3. Is properly lubricated.
4. Motor rotation is correct.
5. Free of overheating.
6. Free of vibration.
7. Free of noise.
8. Functions without overloading.
9. Piping and other connections are completed.
10. No leaks at equipment connections (static pressure testing).

g. Certify Electric Valve Mechanics and Installation.

h. Inspect and certify that each valve meets the following requirements:

1. Not damaged in transportation or installation.
2. Properly installed with no undue force imposed from piping or supports.
3. Is properly lubricated.
4. Motor rotation is correct.
5. Free of overheating.
6. Free of vibration.
7. Free of noise.
8. Properly opens / closes
9. Piping and other connections are completed.
10. No leaks at equipment connections (static pressure testing).

i. Instrumentation and Control Inspection and Test.

2. Tests certificates shall be submitted no later than 30 calendar days, after testing ends. The Engineer and Owner shall have 30 calendar days to complete a review and return with exceptions noted.

3.3 STARTUP (For more information on MBR Startup see Section 45 44 00)

A. Provide 15 days written notice to the Engineer for each startup procedure so that the Engineer may witness each startup procedure. The Engineer may witness the performance of any or all each startup procedure, at the Engineer's option.

B. Startup shall begin after Functional Completion Testing, when the equipment or unit process systems are subject to full operation using a process flow substitute.

1. Startup activities shall be carried out to show the equipment and unit process systems are functional.

2. The various vendors, equipment suppliers and manufacturers shall provide on-site supervision and assistance for Startup services for the new facility.

C. The Contractor shall coordinate all startup activities for equipment and unit process systems in accordance with the accepted Plan. The Contractor shall develop a detailed Startup plan as part of that Plan that includes the following as a minimum:

1. Description of the overall, general startup process.

2. List of equipment and unit process systems included for Startup activities.

3. Detailed startup sequence of activities.

4. Equipment and system boundaries as shown using marked-up P&IDs.

5. Listing of staff and responsibilities for activities.

D. Startup Requirements: The following are minimum requirements for completion of Startup activities:

1. Startup shall show that the equipment or unit process systems are suitable for continuous operation.

a. Startup shall also demonstrate that local and remote instrumentation and controls are functioning properly and communicating with each other properly.

b. Equipment or unit processes shall be operated for a minimum of 72 hours without interruptions in service.

c. If the startup fails, the contractor will be responsible for redoing the startup testing at no additional costs to the Owner.

E. Document Requirements

1. A Startup certificate shall be prepared and submitted to the Engineer for review and returned with any exceptions noted. The reports shall include, but not be limited to, the following:

a. Contractor Review Comments and Approval Page. This page shall include Certification by the preparer that he/she is the person responsible for the test data and the data is authentic and accurate. This page shall include a listing and signature of all witnesses to the test. Certification by the Contractor that the equipment or the unit process systems were operated continuously for the specified period and that the equipment or unit process systems operated in compliance with the specified operating conditions, parameters and performance and that the equipment or unit process systems are suitable for Commissioning.

b. Equipment Suppliers Review Comments and Approval Page. This page shall include Certification by the equipment or unit process systems suppliers that the equipment or unit process systems have been started up properly and operated within the design parameters. Certification by the equipment or unit process systems supplier that the equipment or the unit process systems were operated continuously for the specified period and that the equipment or unit process systems operated in compliance with the specified operating conditions, parameters and performance and that the equipment or unit process systems are suitable for Commissioning.

c. Engineer Review Comments and Approval Page.

d. Process, Equipment, and P&IDs Involved in this startup test.

e. Final Startup Schedule.

f. Test Description and Procedures.

1. Equipment or unit process systems tested.

2. Test dates.

3. Electrical Inspection and Tests.

4. Test results.

5. Any repairs or corrections required to obtain acceptable test results.

6. Calibration sheet for instrumentation or devices used for testing but not part of plant installation.

g. Appendix:

1. A summary of all data used in the calculations, including source, and formulas with all terms defined.

2. Calculations for all data submitted, fully defined.

3. Copies of all raw field data sheets, including those indicating sampling point locations, and notes.

4. Production and operational data.

5. Calibration procedures and work sheets for sampling equipment.

6. Copies of calibration records for instrumentation.

3.04 COMMISSIONING (For more information on MBR Commissioning see Section 45 44 00)

A. Provide 15 working days written notice to the Engineer for each commissioning procedure so that the Engineer may witness each commissioning procedure. The Engineer may witness the performance of any or all each commissioning procedure, at the Engineer's option.

B. Commissioning shall begin after Startup Testing, wherein the equipment or unit process systems are subjected to full operation using the process flows.

1. On successful completion of Startup, process flows and solids shall be used for commissioning the equipment and unit process systems to show the equipment and unit process systems function properly. Commissioning shall confirm the proper operation of the equipment and unit process systems with process fluids and process solids, adjustments shall be made, and the equipment or unit process systems shall be optimized and brought into compliance with design criteria.

2. The various vendors, equipment suppliers and manufacturers shall provide on-site supervision and assistance for Commissioning services for the new facility.

C. The Contractor shall coordinate all Commissioning activities for equipment and unit process systems in accordance with the accepted Plan. The Contractor shall develop a detailed Commissioning plan as part of that Plan that includes the following as a minimum:

1. Description of the overall, general Commissioning process.

2. List of equipment and unit process systems included for Commissioning activities.

3. Detailed Commissioning sequence of activities.

4. Equipment and system boundaries as shown using marked-up P&IDs.

5. Listing of staff and responsibilities for activities.

D. Commissioning Requirements: The following are minimum requirements for completion of Commissioning activities:

1. Commissioning shall show that the equipment and unit process systems are capable of continuous operation using process liquids and solids, chemicals, and utilities; and that the flows, wastewater, operating parameters, and performance requirements have been demonstrated for a minimum of seven days of continuous operation, or the period required in the equipment specifications, whichever is longer.

    a. Shutdowns that occur because of power outages, acts of God, or failure of support systems not part of this contract will not be a cause of failure of the seven days of continuous operation.

2. If the commissioning fails, the contractor will be responsible for redoing the commissioning at no additional cost to the Owner.

E. Documentation Requirements:

1. A Commissioning report shall be prepared and submitted to the Engineer for review and retuned with any exceptions noted. The reports shall include, but not be limited to, the following:

    a. Contractor Review Comments and Approval Page. This page shall include Certification by the preparer that he or she is the person responsible for the test data and the data is authentic and accurate. This page shall include a listing and signature of all witnesses to the test. Certification by the Contractor that the equipment or the unit process systems were operated continuously for the specified period and that the equipment or unit process systems operated in compliance with the specified operating conditions, parameters and performance; and that the equipment or unit process systems are suitable for Performance Testing.

    b. Equipment Suppliers Review Comments and Approval Page. This page shall include Certification by the equipment or unit process systems suppliers that the equipment or unit proves systems have been started up properly and operated within the design parameters. Certification by the equipment or unit process systems supplier that the equipment or the unit process systems were operated continuously for the specified period and that the equipment or unit process systems operated in compliance with the specified operating conditions, parameters and performance; and that the equipment or unit process systems are suitable for Performance Testing.

    c. Engineer Review Comments and Approval Page.

    d. Process, Equipment, and P&IDs Involved in this startup commissioning test.

    e. Commissioning Schedule.

    f. Test Description and Procedures.

1. Equipment or unit process systems tested.
2. Test dates.
3. Electrical Inspection and Tests.
4. Test results.
5. Any repairs or corrections required to obtain acceptable test results.
6. Calibration sheet for instrumentation or devices used for testing but not part of plant installation.

g. Appendix:

1. A summary of all data used in the calculations, including source, formulas with all terms defined.
2. Calculations for all data submitted, fully defined.
3. Copies of all raw field data sheets, including those indicating sampling point locations, and notes.
4. Production and/or operational data.
5. Calibration procedures and work sheets for sampling equipment.
6. Copies of calibration records for instrumentation.

3.05 PERFORMANCE TESTING

(For more information on MBR Performance Testing see Section 45 44 00)

A. Begin a seven-day Performance Test after successful commissioning and approval by regulatory agencies including, but not limited to Georgia EPD.

END OF SECTION

INDEX TO

SECTION 01 78 33

BONDS

SECTION 01 78 33

BONDS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Preparation and submittal of bonds.

B. Time and schedule of submittals.

1.02 RELATED SECTIONS

A. City's front end documents – Invitation to Bid and Instruction to Bidders.

B. Document General Conditions – EJCDC: Performance bond and labor and material payment bonds.

C. Section 01 77 00 –Closeout Procedures: Contract closeout procedures.

D. Section 01 78 23 – Operation and Maintenance Data.

E. Individual Specifications Sections: Bonds required for specific Products or Work.

1.03 FORM OF SUBMITTALS

A. Bind in commercial quality 8–1/2 x 11 appropriately sized, D-ring binders with durable covers.

B. Cover: Identify each binder with typed or printed title BONDS with title of Project; name, address, and telephone number of Contractor and equipment supplier; and name of responsible company principal.

C. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of Product or work item.

D. Separate each bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principals.

E. Provide a summery sheet of all bonds.

1.04 PREPARATION OF SUBMITTALS

A. Obtain bonds executed by responsible Subcontractors, suppliers, and manufacturers, in accordance with timeframes listed herein.

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

C. Co–execute submittals when required.

D. Retain bonds until time specified for submittal.

1.05 TIME OF SUBMITTALS

A. For equipment or components of equipment put into service during construction with Owner's permission, submit documents within ten days of Owner's acceptance.

B. Make other submittals within ten days of date of final acceptance of the item or Work, prior to final Application for Payment.

C. For items or Work for which acceptance is delayed beyond date of completion, submit within ten days of acceptance, listing the date of acceptance as the beginning of the bond period.

END OF SECTION

INDEX TO

SECTION 01 78 36

WARRANTIES

SECTION 01 78 36

WARRANTIES

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Preparation and submittal of warranties.

B. Time and schedule of submittals.

1.02 RELATED SECTIONS

A. General Conditions – EJCDC: Warranties and correction of work.

B. Section 01 77 00 – Closeout Procedures: Contract closeout procedures.

C. Section 01 78 23 – Operation and Maintenance Data.

D. Individual Specifications Sections: Warranties required for specific Products or Work.

1.03 FORM OF SUBMITTALS

A. Bind in commercial quality 8–1/2 x 11, appropriately sized, D- ring binders with durable covers.

B. Cover: Identify each binder with typed or printed title WARRANTIES with title of Project; name, address, and telephone number of Contractor and equipment supplier; and name of responsible company principal.

C. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual. Identify each item with the name of Product or work item and the number and title of the specification section in which it is specified.

D. Separate each warranty with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

E. Provide a summery sheet of all warranties.

1.04 PREPARATION OF SUBMITTALS

A. Obtain bonds executed by responsible Subcontractors, suppliers, and manufacturers, in accordance with timeframes listed herein.

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

C. Co–execute submittals when required.

D. Retain warranties until time specified for submittal.

1.05 TIME OF SUBMITTALS

A. For equipment or components of equipment put into service during construction with Owner's permission, submit documents within ten days of Owner's acceptance.

B. Make other submittals within ten days of date of final acceptance of the item or Work, prior to final Application for Payment.

C. For items or Work for which acceptance is delayed beyond date of final completion, submit within ten days of acceptance, listing the date of acceptance as the beginning of the warranty period.

END OF SECTION

INDEX TO

SECTION 01 79 00

DEMONSTRATION AND TRAINING

SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Specifications, apply to this Section.

1.02 SUMMARY

A. Section includes administrative and procedural requirements for instructing utilities personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.

2. Training in operation and maintenance of systems, subsystems, and equipment.

3. General Contractor to make **video** of all equipment and components training and start-up. A copy of the training shall be made to the owner and the Engineer for future reference.

1.03 INFORMATION SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' name for each training module. Include outline for each training module.

B. Qualification Data: For instructor, demonstrating qualifications and ability to instruct on maintenance and care of system, equipment, and products.

C. Schedule of Demonstration and Training: Prepare a schedule in tabular form of all demonstration and training required in individual Specification Sections including:

1. Specification Section number and title.

2. Description of required demonstration and training.

D. Attendance Record: For each training module, submit list of participants and length of instruction time.

1.04 QUALITY ASSURANCE

A. Instructor Qualifications: A factory-authorized service representative, experienced in operation and maintenance procedures and training. Manufacturer's sales staff is not acceptable.

B. Pre-instruction Conference: Conduct conference at Project site to review methods and procedures related to demonstration and training.

PART 2 – PRODUCTS

2.01 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Provide trainee manuals.

C. Training Modules: For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Including the following:

   a. System, subsystem, and equipment descriptions.

   b. Operating standards.

   c. Regulatory requirements.

   d. Equipment function.

   e. Operating characteristics.

   f. Limiting conditions.

   g. Performance curves.

2. Documentation: Review the following items in detail:

   a. Emergency manuals.

   b. Operations manuals.

   c. Maintenance manuals.

   d. Project record documents.

   e. Identification systems.

   f. Warranties and bonds.

   g. Maintenance service agreement and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

a. Instructions on meaning of warnings, trouble indications, and error messages.

b. Instructions on stopping.

c. Shutdown instructions for each type of emergency.

d. Operating instructions for conditions outside of normal operating limits.

e. Sequences for electric or electronic systems.

f. Special operating instructions and procedures.

g. A tour of the installation identifying the location of all system components.

4. Operations: Include the following, as applicable:

a. Startup procedures.

b. Equipment or system break-in procedures.

c. Routine and normal operating instructions.

d. Regulation and control procedures.

e. Control sequences.

f. Safety procedures.

g. Instructions on stopping.

h. Normal shutdown instructions.

i. Operating procedures for emergencies.

j. Operating procedures for system, subsystem, or equipment failure.

k. Seasonal and weekend operating instructions.

l. Required sequences for electric or electronic systems.

m. Special operating instructions and procedures.

n. Sequence of operation.

5. Adjustments: Include the following:

a. Alignments.

b. Checking adjustments.

c. Noise and vibration adjustments.

d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.

b. Testing and inspection procedures.

7. Maintenance: Include the following:

a. Inspection of procedures.

b. Types of cleaning agents to be used and methods of cleaning.

c. List of cleaning agents and methods of cleaning detrimental to product.

d. Procedures for routine cleaning.

e. Procedures for preventative maintenance.

f. Procedures for routine maintenance.

g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.

b. Repair instructions.

c. Disassembly; component removal, repair, and replacement; and reassembly instructions.

d. Instructions for identifying parts and components.

e. Review of spare parts needed for operation and maintenance.

f. Product support/service model.

g. Purchasing of replacement parts.

9. Instruction specific to Instrumentation and Controls, Electrical, Lighting Controls, or any other new technology that is integrated with another system: Include the following:

a. Overview and theory.

b. Wiring diagrams, including the one-line diagram.

c. Graphics packages and touch screens for the system.

d. Alarms and diagnostics.

e. Reporting functions dynamically and historically.

f. Remote access to the system.

g. Database back-up and maintenance.

h. Replacement and re-programming of replacement parts.

i. Programming.

j. Help files and other troubleshooting documentation.

D. Operation and Maintenance Manuals: Provide appropriate Operation and Maintenance manuals in each training session so that the detail drawings and maintenance activities are outlined and discussed for each application.

PART 3 - EXECUTION

3.01 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module.

B. Set up instructional equipment at instruction location.

3.02 INSTRUCTION

A. Engage qualified instructors to instruct personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Coordinate schedule for all training with Engineer and provide the following:

a. Minimum three weeks notification.

b. Training matrix in calendar format.

c. Training outline for each session.

2. Do not schedule until equipment has been started up, commissioned, and is currently operating in its normal condition.

3. Do not schedule overlapping training sessions.

4. Schedule training sessions for a maximum of four hours per day; afternoons preferred.

5. Provide separate training session on each system for operational/maintenance groups and user groups.

6. Training sessions will be cancelled and rescheduled unless the following documentation is received:

   a. Instruction qualifications.

   b. Evidence that equipment has been started up, commissioned, and is currently operating in its normal condition.

   c. Operation and Maintenance manuals.

C. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION

INDEX TO

SECTION 01 79 01

EQUIPMENT AND SYSTEM PERFORMANCE AND OPERATIONAL TESTING

SECTION 01 79 01

EQUIPMENT AND SYSTEM PERFORMANCE AND OPERATIONAL TESTING

PART 1 – GENERAL

1.01 DESCRIPTION

A. This section contains requirements for the Contractor's performance in documenting testing work required under this contract. In addition, this section contains requirements the for the Contractor's performance during installed performance testing of all mechanical, electrical, instrumentation, and HVAC equipment and systems, including structures for watertight construction, provided under this. This section supplements but does not supersede specific testing requirements found elsewhere in this project manual.

B. After equipment has been shown thru functional completion testing to be ready for equipment and process start up, the following outline applies for the MBR process.

1. Startup (clean water testing) is defined as the operation of equipment or unit process systems using clean water, air, or other fluids and gases as necessary to demonstrate the operation of the equipment or unit process systems with other equipment that is a part of or a treatment process for the Facility. (up to 20 days)

2. Commissioning is defined as the operation of equipment of unit process systems using wastewater, process liquids or process solids, plant support equipment, and plant utilities to demonstrate equipment or unit process systems are capable of processing water or wastewater at specified flows and conditions for a sustained period of operation as required by this section or equipment or unit process systems are ready to begin Performance Testing. (up to 120 days)

3. Performance Testing is defined as a test to demonstrate the specified throughout of the equipment and unit process systems while maintaining regulatory compliance with Federal, State, and Local government regulations and minimum compliance with the equipment or unit process systems performance requirements and guarantees. (up to 20 days)

4. During the performance testing, daily equal volume composite samples from the influent and effluent shall be obtained by the Contractor (or Owner if contractor makes prior arrangements for the owner to assist).

5. These samples will be for the measurement of the following parameters by the contractor:
   a. BOD
   b. TSS
   c. TKN
   d. NH3
   e. TP

f. TN
g. Flow

6. The treated effluent shall meet these parameters:

	Parameter	Effluent Limits
a.	BOD_5	<5 mg/L
b.	TSS	<5 mg/L
c.	TKN	<13 mg/L
d.	NH_3-N	<1mg/L
e.	TP as P	<0.5 mg/L
f.	TN	<10 mg/L
g.	Fecal/Coliform	200/100 mL

7. Operating period: is defined as a 60-day period that the Owner operates the plant while the contractor provides personnel which are available to answer questions, address operational issues and/or equipment malfunctions/adjustments and similar items during the initial operating period.

C. Performance Testing shall be completed for items of equipment and unit process systems to confirm that the equipment or unit process systems meet the Guaranteed Performance Criteria and the equipment and unit process systems performance criteria specified for the equipment or unit process. Performance Testing shall include testing requires by regulatory agencies or environmental regulations. Performance Testing shall be performed to demonstrate the specified throughput of the equipment and unit process systems while maintaining regulatory compliance with Federal, State, and Local government regulations and minimum compliance with the equipment or unit process systems performance requirements and guarantees.

D. The information collected shall be used as a basis for determining acceptability of the equipment or unit process systems to meet performance requirements.

E. If any of the equipment or unit process systems fail to meet the specified requirements and guarantees, it shall be the responsibility of the Contractor and equipment suppliers to make the necessary corrections or replacements and repeat the test. This procedure shall be followed until all equipment meets the guaranteed performance requirements and has been accepted by the Engineer.

F. All modifications required to meet performance criteria, and all retesting shall be performed at no additional cost to the Owner. This includes payment of all engineering fees and expenses associated with the Owner's other Consultant's observation of the retest.

G. Corrective work resulting from failed performance shall be immediately scheduled and work shall commence within one week unless there is supportable proof that this is impossible. In that case, the Contractor shall request in writing an extension of time indicating the exact time the corrective work will begin.

H. In the event that the equipment of unit process systems does not meet pass/fail criteria of the Performance Guarantees within the extension period stipulated in the

Contract, the Engineer shall determine acceptance per the provisions included in the Contract.

1.02 QUALITY ASSURANCE

A. CONTRACTOR'S QUALITY ASSURANCE MANAGER:

1. The Contractor shall appoint an operations engineer or equally qualified operations specialist as Quality Assurance Manager to manage, coordinate, and supervise the Contractor's quality assurance program. The Quality Assurance Manager shall have at least five years of total experience, or experience on at least five separate projects, in managing the startup commissioning of mechanical, electrical, instrumentation, HVAC, process, piping systems, and MBR systems. The quality assurance program shall include:

   a. A testing plan setting forth the sequence in which all testing work required under this project manual will be implemented.

   b. A documentation program to record the results of all equipment and system tests.

   c. An installed performance testing program for all piping, mechanical, electrical, instrumentation, and HVAC equipment and systems installed under this contract.

   d. A calibration program for all instruments, meters, monitors, gages, and thermometers installed under this contract.

   e. A calibration program for all instruments, gages, meters, and thermometers used for determining the performance of equipment and systems installed under this contract.

   f. A testing schedule conforming to the requirements specified in paragraph 01 79 01-2.02 C.

      1. For the purposes of this section, a system shall include all items of equipment, devices and appurtenances connected in such a fashion as their operation or function complements, protects or controls the operation or function of the others. The Quality Assurance Manager shall coordinate the activities of all subcontractors and suppliers to implement the requirements of this section.

B. CALIBRATION:

1. All test equipment (gages, meters, thermometers, analysis instruments, and other equipment) used for calibrating or verifying the performance of equipment installed under this contract shall be calibrated to within plus or minus two percent of actual value at full scale. Test equipment employed for individual test runs shall be selected so that expected values as indicated by the detailed performance specifications will fall between 60 and 85

percent of full scale. Pressure gages shall be calibrated in accordance with ANSI/ASME B40.1. Thermometers shall be calibrated in accordance with ASTM E77 and shall be furnished with a certified calibration curve.

2. Liquid flow meters, including all open channel flow meters and all meters installed in pipelines with diameters greater than two inches shall be calibrated in situ using either the total count or dye dilution methods. Gas flow meters installed in piping systems with diameters greater than six inches shall be calibrated in situ using the pitot tube velocity averaging method. Flow meter calibration work shall be performed by individuals skilled in the techniques to be employed. Calibration tests for flow metering systems shall be performed over a range of not less than ten percent to at least 75 percent of system full scale. At least five confirmed valid data points shall be obtained within this range. Confirmed data points shall be validated by not less than three test runs with results which agree within plus or minus two percent.

C. REFERENCES:

1. This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

2. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
ANSI/ASME B40.1	Gauges Pressure Indicating Dial Type—Elastic Element
ASTM E77	Method for Verification and Calibration of Liquid-in-Glass Thermometers
ASHRAE 41.8	Standard Methods of Measurement of Flow of Gas
Dye Dilution Calibration Method	Flow Measurements in Sanitary Sewers By Dye Dilution, Turner Designs Mountain View, California,
	Flow Measurement in Sewer Lines by the Dye Dilution Method, Journal of the Water Pollution Control Federation, Vol. 55, Number 5, May 1983, pg. 531

Reference	Title
	Flow Measurement in Open Channels and Closed Conduits, Vol 1, U.S. Department of Commerce, National Bureau of Standards, pg. 361
	Techniques of Water-Resources Investigations of the United States Geological Survey, Chapter 16, Measurement of Discharge Using Tracers

1.03 SUBMITTALS

A. Submittal shall consist of the following:

1. A complete description of the Contractor's plan for documenting the results from the test program in conformance with the requirements of paragraph 01 79 01-2.02 A, including:

   a. Proposed plan for documenting the calibration of all test instruments.

   b. Proposed plan for calibration of all instrument systems, including flow meters and all temperature, pressure, weight, and analysis systems.

   c. Sample forms for documenting the results of field pressure and performance tests.

2. The credentials and certification of the testing laboratory proposed by the Contractor for calibration of all test equipment.

3. Preoperational check-out procedures reviewed and approved by the respective equipment manufacturers.

4. Detailed testing plans, setting forth step-by-step descriptions of the procedures proposed by the Contractor for the systematic testing of all equipment and systems installed under this contract.

5. A schedule and subsequent updates, presenting the Contractor's plan for testing the equipment and systems installed under this contract.

6. A schedule establishing the expected time period (calendar dates) when the Contractor plans to commence operational testing of the completed systems, along with a description of the temporary systems and installations planned to allow operational testing to take place.

7. A summary of the Quality Assurance Manager's qualifications, showing conformance to paragraph 01 79 01-1.02 A requirements.

PART 2 – PRODUCTS

2.01 GENERAL

A. The Contractor shall prepare test plans and documentation plans as specified in the following paragraphs. The Engineer will not witness any test work for the purpose of acceptance until all test documentation and calibration plans and the specified system or equipment test plans have been submitted and accepted.

2.02 DOCUMENTATION

A. DOCUMENTATION PLANS:

1. The Contractor shall develop a record keeping system to document compliance with the requirements of this Section. Calibration documentation shall include identification (by make, manufacturer, model, and serial number) of all test equipment, date of original calibration, subsequent calibrations, calibration method, and test laboratory.

2. Equipment and system documentation shall include date of test, equipment number or system name, nature of test, test objectives, test results, test instruments employed for the test, and signature spaces for the Engineer's witness and the Contractor's quality assurance manager. A separate file shall be established for each system and item of equipment. These files shall include the following information as a minimum:

   a. Metallurgical tests
   b. Factory performance tests
   c. Accelerometer recordings made during shipment
   d. Field calibration tests[1]
   e. Field pressure tests[1]
   f. Field performance tests[1]
   g. Field operational tests[1]

3. Section 01 99 90 contains samples showing the format and level of detail required for the documentation forms. The Contractor is advised that these are samples only and are not specific to this project nor to any item of equipment or system to be installed under this contract. The Contractor shall develop test documentation forms specific to each item of equipment and system installed under this contract. Acceptable documentation forms for all systems and items of equipment shall be produced for review by the Engineer as a condition precedent to the Contractor's receipt of progress payments in excess of 50 percent of the contract amount. Once the Engineer has reviewed and taken no exception to the forms proposed by the Contractor, the Contractor shall produce sufficient forms, at his expense, to provide documentation of all testing work to be conducted as a part of this contract.

B. TEST PLANS:

[1]Each of these tests is required even though not specifically noted in detailed specification section.

1. The Contractor shall develop test plans detailing the coordinated, sequential testing of each item of equipment and system installed under this contract. Each test plan shall be specific to the item of equipment or system to be tested. Test plans shall identify by specific equipment or tag number. Each device or control station to be manipulated or observed during the test procedure, and the specific results to be observed or obtained. Test plans shall also be specific as to support systems required to complete the test work, temporary systems required during the test work, subcontractors' and manufacturers' representatives to be present and expected test duration. As a minimum, the test plans shall include the following features:

    a. Step-by-step proving procedure for all control and electrical circuits by imposing low voltage currents and using appropriate indicators to affirm that the circuit is properly identified and connected to the proper device.

    b. Calibration of all analysis instruments and control sensors.

    c. Performance testing of each individual item of mechanical, electrical, and instrumentation equipment. Performance tests shall be selected to duplicate the operating conditions described in the project manual.

    d. System tests designed to duplicate, as closely as possible, operating conditions described in the project manual.

2. Test plans shall contain a complete description of the procedures to be employed to achieve the desired test environment.

3. As a condition precedent to receiving progress payments in excess of 75 percent of the contract amount, or in any event, progress payments due to the Contractor eight weeks in advance of the date the Contractor wishes to begin any testing work (whichever occurs earliest in the project schedule), the Contractor shall have submitted all test plans required for the systematic field performance and operational tests for all equipment and systems installed under this contract. The Contractor shall reproduce the plans in sufficient number for the Contractor's purposes and an additional ten copies for delivery to the Engineer. No test work shall begin until the Contractor has delivered the specified number of final test plans to the Engineer.

C. TESTING SCHEDULE:

1. The Contractor shall produce a testing schedule setting forth the sequence contemplated for performing the test work. The schedule shall be in bar chart form, plotted against calendar time, shall detail the equipment and systems to be tested, and shall be coordinated with the Contractor's construction schedule. The schedule shall show the contemplated start date, duration of the test and completion of each test. The test schedule shall be submitted no later than four weeks in advance of the date testing is to begin. The Engineer will not witness any testing work for the purpose of acceptance until the Contractor has submitted a schedule to which the

Engineer takes no exception. The test schedule shall be updated weekly, showing actual dates of test work, indicating systems and equipment testing completed satisfactorily and meeting the requirements of this project manual.

a. The cost for the labor to conduct the testing shall be included in the lump sum cost of the project. The cost of test media, chemicals, electric power, and natural gas will be included in the lump sum cost of the project. The cost of test media, chemicals, electric power, and natural gas for any retesting will be accomplished at no additional cost to the Owner.

b. The tests shall be conducted in accordance with applicable industry standard techniques.

1. Local and remote on-site instrumentation equipment may be used to record test data where it is determined to be sufficiently accurate to obtain the necessary data for the performance evaluation.

2. Where special analysis and emissions testing are required, or other resources are needed for testing, the Contractor shall be responsible for providing them.

3. Where local instrumentation is available, manual logging of the data shall be done in conjunction with the instrumentation readings to verify remote instrumentation readings.

4. Any necessary adjustment to test results shall be made by use of standard formulas and relationships.

2. All data values shall be reported both as "measured" and corrected as required by the performance or regulations. Data values shall be stated in the engineering units noted for guaranteed performance or regulatory compliance.

3. Performance Testing shall be witnessed by the Engineer and Owner.

PART 3 – EXECUTION

3.01 GENERAL

A. The Contractor's quality control manager shall organize teams made up of qualified representatives of equipment suppliers, subcontractors, the Contractor's independent testing laboratory, and others, as appropriate, to efficiently and expeditiously calibrate and test the equipment and systems installed and constructed under this contract. The objective of the testing program shall be to demonstrate, to the Engineer's complete satisfaction, that the structures, systems, and equipment constructed and installed under this contract meet all performance requirements and the facility is ready for the commissioning process to commence.

In addition, the testing program shall produce baseline operating conditions for the Owner to use in a preventive maintenance program.

3.02 CALIBRATION OF FIXED INSTRUMENTS

A. Calibration of analysis instruments, sensors, gages, and meters installed under this contract shall proceed on a system-by-system basis. No equipment or system performance acceptance tests shall be performed until instruments, gages, and meters to be installed in that particular system have been calibrated and the calibration work has been witnessed by the Engineer.

B. All analysis instruments, sensors, gages, and meters used for performance testing shall be subject to recalibration to confirm accuracy after completion, but prior to acceptance of each performance test. All analysis instruments, sensors, gages, and meters installed under this contract shall be subject to recalibration as a condition precedent to commissioning.

3.03 START UP TESTS

A. GENERAL:

1. Tests shall consist of the following:

   a. Pressure and leakage tests.

   b. Electrical testing as specified in the applicable section.

   c. Wiring and piping, individual component, loop, loop commissioning, and tuning testing as described in the applicable section.

   d. Preoperational checkout for all mechanical and HVAC equipment. Preoperational check-out procedures shall be reviewed and approved by the respective equipment manufacturers.

   e. Initial operation tests of all mechanical, electrical, HVAC, and instrumentation equipment and systems to demonstrate compliance with the performance requirements of this project manual.

2. In general, tests for any individual system shall be performed in the order listed above. The order may be altered only on the specific written authorization of the Engineer after receipt of a written request, complete with justification of the need for the change in sequence.

B. PRESSURE AND LEAKAGE TESTS:

1. Pressure and leakage tests (including air tests for gravity lines) shall be conducted in accordance with applicable portions of these. All acceptance tests shall be witnessed by the Engineer. Evidence of successful completion of the pressure and leakage tests shall be the Engineer's signature on the test forms prepared by the Contractor.

C. FUNCTIONAL CHECKOUT:

1. Prior to energization (in the case of electrical systems and equipment), all circuits shall be rung out and tested for continuity and shielding in accordance with the procedures required in elsewhere.

D. COMPONENT CALIBRATION AND LOOP TESTING:

1. Prior to energization (in the case of instrumentation system and equipment), all loops and associated instruments shall be calibrated and tested in accordance with the procedures required in elsewhere.

E. ELECTRICAL RESISTANCE:

1. Electrical resistance testing.

F. PREOPERATIONAL TESTS:

1. Preoperational tests shall include the following:

   a. Alignment of equipment using reverse dial indicator method.

   b. Preoperational lubrication.

   c. Tests per the manufacturers' recommendations for prestart preparation and preoperational check-out procedures.

G. FUNCTIONAL TESTS:

1. GENERAL: Once all affected equipment has been subjected to the required preoperational check-out procedures and the Engineer has witnessed and has not found deficiencies in that portion of the work, individual items of equipment and systems may be started and operated under simulated operating conditions to determine as nearly as possible whether the equipment and systems meet the requirements of these specifications. If available, plant effluent may be employed for the testing of all liquid systems except gaseous, oil, or chemical systems. If not available, potable water shall be employed as the test medium. Test media for these systems shall either be the intended fluid or a compatible substitute. The equipment shall be operated a sufficient period to determine machine operating characteristics, including noise, temperatures and vibration; to observe performance characteristics; and to permit initial adjustment of operating controls. When testing requires the availability of auxiliary systems such as looped piping, electrical power, compressed air, control air, or instrumentation which have not yet been placed in service, the Contractor shall provide acceptable substitute sources, capable of meeting the requirements of the machine, device, or system at no additional cost to the Owner. Disposal methods for test media shall be subject to review by the Engineer. During the functional test period, the Contractor shall obtain baseline operating data on all equipment with motors greater than 1 horsepower to include amperage, bearing temperatures, and vibration. The baseline data shall be collected for the Owner to enter in a preventive maintenance system.

Test results shall be within the tolerances set forth in the detailed specification sections of this project manual. If no tolerances have been specified, test results shall conform to tolerances established by recognized industry practice. Where, in the case of an otherwise satisfactory functional test, any doubt, dispute, or difference should arise between the Engineer and the Contractor regarding the test results or the methods or equipment used in the performance of such test, then the Engineer may order the test to be repeated. If the repeat test, using such modified methods or equipment as the Engineer may require, confirms the previous test, then all costs about the repeat test will be paid by the Owner. Otherwise, the costs shall be borne by the Contractor. Where the results of any functional test fail to comply with the contract requirements for such test, then such repeat tests as may be necessary to achieve the contract requirements shall be made by the Contractor at his expense.

The Contractor shall provide, at no expense to the Owner, all power, fuel, compressed air supplies, water, and chemicals, all labor, temporary piping, heating, ventilating, and air conditioning for any areas where permanent facilities are not complete and operable at the time of functional tests, and all other items and work required to complete the functional tests. Temporary facilities shall be maintained until permanent systems are in service.

2. RETESTING: If under test, any portion of the work should fail to fulfill the contract requirements and is adjusted, altered, renewed, or replaced, tests on that portion when so adjusted, altered, removed, or replaced, together with all other portions of the work as are affected thereby, shall, unless otherwise directed by the Engineer, be repeated within reasonable time and in accordance with the specified conditions. The Contractor shall pay to the Owner all reasonable expenses incurred by the Owner, including the costs of the Engineer, as a result of repeating such tests.

3. POSTTEST INSPECTION: Once functional testing has been completed, all machines shall be rechecked for proper alignment and realigned, as required. All equipment shall be checked for loose connections, unusual movement, or other indications of improper operating characteristics. Any deficiencies shall be corrected to the satisfaction of the Engineer. All machines or devices which exhibit unusual or unacceptable operating characteristics shall be disassembled and inspected. Any defects found during the inspection shall be repaired or the specific part or entire equipment item shall be replaced to the complete satisfaction of the Engineer at no cost to the Owner.

3.04 COMMISSIONING

A. The Contractor shall provide system operation testing. After completion of all start up testing, the Contractor shall fill all process units and process systems, except those employing domestic water, oil, air, or chemicals, with plant effluent water. All domestic water, oil, air, and chemical systems shall be filled with the specified fluid.

B. Upon completion of the filling operations, the Contractor shall circulate water through the completed facility for a period of not less than 48 hours, during which all parts of the system shall be operated as a complete facility at various loading conditions, as directed by the Engineer. The testing period shall commence after this initial period of variable operation. This testing period shall be 14 days. Should the testing period be halted for any reason related to the facilities constructed or the equipment furnished under this contract, or the Contractor's temporary testing systems, the testing program shall be repeated until the specified continuous period has been accomplished without interruption. All process units shall be brought to full operating conditions, including temperature, pressure, and flow.

C. As-built documents of facilities involved shall be accepted and ready for turnover to the Owner at the time of the testing.

3.05 PERFORMANCE TESTING

Performance Testing is defined as a test to demonstrate the specified throughout of the equipment and unit process systems while maintaining regulatory compliance with Federal, State, and Local government regulations and minimum compliance with the equipment or unit process systems performance requirements and guarantees. (minimum 30 days).

3.06 INDEPENDENT TESTING ORGANIZATION

A. The Contractor shall be responsible for the contracting of an Independent Testing Organization and shall be responsible for payment of their services.

B. The testing organization will be under the direct supervision of the Contractor, with input from the equipment and unit process systems suppliers, and the Engineer.

1. All instructions, and any other type contact or correspondence shall be through the Contractor.

2. The Contractor shall submit qualifications for the Independent Testing Organization to the Engineer for review.

3.07 TEST COORDINATION

A. Where required, the Contractor shall furnish an authorized competent representative of the equipment or unit process systems suppliers to attend and coordinate the test program.

1. Test coordinator scope of services shall include preliminary instructions and orientation of Contactor's personnel prior to the actual test, instructions throughout the test period, recommended variations, if required, to assure validity of the test, and posttest instructions for system shutdown or continued operation as required by the Engineer.

2. Instrument readings and other test data shall be tabulated by the Contractor.

3. Data sheet copies shall be submitted to the Engineer for review and analysis at the end of each testing day.

B. The Contractor will work closely with the equipment or unit process systems supplier to aid in coordination of required plant functions involving systems not furnished by the suppliers of the equipment or unit process systems being tested. This shall include but is not limited to support equipment, utilities, and support processes.

3.08 TEST METHODS

A. Methods of data collections and analysis used for Performance Testing to show compliance shall be as required by regulatory agencies, industry standards and as specified with the equipment or unit process systems.

3.09 RESPONSIBILITIES

A. Responsibility for performance testing shall be with the Contractor. These assignments shall be detailed and assigned as part of the detailed test plan.

B. Manual logging of operations parameters shall be the responsibility of the Contractor, equipment, or unit process systems supplier.

C. Collections of samples shall be the responsibility of the Independent Testing Organization and may be performed by the Independent Testing Organization.

D. The Independent Testing Organization shall be responsible for tagging all samples, and for the orderly transfer to the Independent Testing Organization.

1. Both the Contractor and the testing organization shall be responsible for completing a Chain-of-Custody log of all samples.

E. All laboratory testing of samples shall be the responsibility of the Independent Testing Organization and shall be performed at the testing organization's laboratory. The Contractor shall be responsible for operating the equipment or unit process systems.

3.10 REPORTS

A. Reports are required for all tests specified in the individual specifications for equipment and unit process. Four copies of preliminary test reports shall be supplied to the Engineer for review and returned with any applicable notes.

B. Tests reports shall be submitted no later than ten calendar days after testing ends. The Contractor shall assist and furnish required information in a timely manner including operating data sheets.

C. The reports shall include, but not be limited to, the following:

1. Cover. Including name and location of the plant, the equipment or unit process systems tested, name and address of the testing organization, and dates of the test.

2. Certification. A page including a certification by the report preparer that he or she is the person responsible for the test data, and one by the Contractor or equipment or unit process systems certifying authenticity and accuracy of the report.

3. Table of Contents.

4. Introduction. Pertinent background information shall be presented in this Section. The information shall include, but not be limited to, the following:

   a. Equipment or unit process systems tested.
   b. Test purpose.
   c. Name and address of suppliers, and testing organization.
   d. Test dates.
   e. Items of performance criteria tested.
   f. Names of persons present for test.
   g. Any other important background information.

5. Summary. A comprehensive summary of the test results with sufficient information and data necessary to evaluate the process with respect to the applicable performance specifications. This information shall include, but not be limited to, the following:

   a. A summary of the test results.

   b. Comparison of test results with required performance criteria.

   c. Process and operation data or parameters that can be used to verify operation at performance criteria.

   d. A description and results of any analyses of samples collected during the test that supports the test results.

   e. Discussion of errors, both real and apparent, in the test.

6. Methods. A description of the sampling and analytical methods used.

7. Operation. Facility Operation during Testing shall contain:

   a. Presentation of the process data for the test, with calculations where necessary to show the solids throughput or production to demonstrate that the operating conditions are sufficiently representative of those required for testing. Calculations may be included in the Appendix.

   b. Process and control equipment flow diagram.

8. Appendix.

   a. A summary of all data used in the calculations, including source, formulas with all terms defined.

b. Calculations for all data submitted, fully defined.

c. Copies of all raw field data sheets, including those indicating sampling point locations, and notes.

d. Laboratory report, complete with analytical data sheets and chain of custody list.

e. Production and/or operational data.

f. Calibration procedures and work sheets for sampling equipment.

g. Copies of calibration records for instrumentation.

h. Pertinent correspondence concerning test.

i. Any other information necessary to assist the Owner in deciding of compliance with the contract documents or to assist the Agency in making a determination of compliance with Federal, State, and Local regulations.

END OF SECTION

SECTION 01 99 90

REFERENCE FORMS

The forms listed below and included in this section are referenced from other sections of the project manual (not all forms may be referenced or used):

Form No.	Title
01300–A	Submittal Transmittal Form
01660–A	Equipment Test Report Form
01730–A	Operation and Maintenance Transmittal Form
01730–B	Equipment Record Form
01730–C	Equipment Record Form
09900–A	Coating System Inspection Checklist
11000–A	Manufacturer's Installation Certification Form
11000–B	Manufacturer's Instruction Certification Form
11000–C	Unit Responsibility Certification Form
11002–A	Rigid Equipment Mount Installation Inspection Checklist
11060–A	Motor Data Form
16000–A	Wire and Cable Resistance Test Data Form
16000–B	Installed Motor Test Data Form
16000–C	Dry Transformer Test Data Form
16000–D	Motor Control Center Test Form
16000–E	Medium Voltage Motor Starter Test Form
16000–F	Medium Voltage Switchgear Test Form
16000–G	Protective Relay Test Form
16000–H	Low Voltage Switchgear Test Form
16000–I	Medium Voltage Load Interrupter Switch Test Form
16000–J	Liquid–Filled Transformer Test Form
16000–K	Automatic Transfer Switch Test Form
16000–L	Neutral Grounding Resistor Test
17000–A	Loop Wiring and Insulation Resistance Test Data Form
17000–B	Control Circuit Piping Leak Test Form
17000–C	Controller Calibration Test Data Form
17000–D	Panel Indicator Calibration Test Data Form
17000–E	Recorder Calibration Test Data Form
17000–F	Signal Trip Calibration Test Data Form
17000–G	Field Switch Calibration Test Data Form
17000–H	Transmitter Calibration Test Data Form
17000–I	Miscellaneous Instrument Calibration Test Data Form
17000–J	Individual Loop Test Data Form
17000–K	Loop Commissioning Test Data Form

01300–A. SUBMITTAL TRANSMITTAL FORM:
SUBMITTAL TRANSMITTAL

Submittal Description: _____ Submittal No:[1] _____

Spec Section: _____

	Routing	Sent	Received
OWNER:	Contractor/CM		
PROJECT:	CM/Engineer		
	Engineer/CM		
CONTRACTOR:	CM/Contractor		

We are sending you ☐ Attached ☐ Under separate cover via _____

☐ Submittals for review and comment ☐ Product data for information only

Remarks: _____

Item	Copies	Date	Section No.	Description	Review Action [a]	Reviewer initials	Review comments attached

[a] **Note: NET = No exceptions taken; MCN = Make corrections noted; A&R = Amend and resubmit; R = Rejected**
Attach additional sheets if necessary.

[1]See paragraph 01300-4.0 A, Transmittal Procedure.

Contractor

Certify either A or B:

☐ A. We have verified that the material or equipment contained in this submittal meets all the requirements, including coordination with all related work, specified (no exceptions).

☐ B. We have verified that the material or equipment contained in this submittal meets all the requirements specified except for the attached deviations.

No.	Deviation

Certified by: _____

Contractor's Signature

NOTE: This example equipment test report is provided for the benefit of the Contractor and is not specific to any piece of equipment to be installed as a part of this project. The example is furnished as a means of illustrating the level of detail required for the preparation of equipment test report forms for this project.

CITY OF SAMPLE

EXAMPLE WATER TREATMENT PLANT
STAGE IV EXPANSION PROJECT

ABC Construction Company, Inc., General Contractor
XYZ Engineering, Inc., Construction Manager

EQUIPMENT TEST REPORT

Equipment Name: Sludge Pump
Equipment Number: P25202
Specification Ref: 11390
Location: East Sedimentation Basin Gallery

	Contractor		Construction Manager	
	Verified	Date	Verified	Date
PREOPERATIONAL CHECKLIST				
Mechanical				
Lubrication				
Alignment				
Anchor bolts				
Seal water system operational				
Equipment rotates freely				
Safety guards				
Valves operational				
Hopper purge systems operational				
Sedimentation tank/hopper clean				
O&M manual information complete				
Manufacturer's installation certificate complete				
Electrical (circuit ring–out and high–pot tests)				
Circuits:				
Power to MCC 5				
Control to HOA				
Indicators at MCC:				
Red (running)				
Green (power)				
Amber (auto)				
Indicators at local control panel				

	Contractor		Construction Manager	
	Verified	Date	Verified	Date
Wiring labels complete				
Nameplates:				
MCC				
Control station				
Control panel				
Equipment bumped for rotation				
Piping Systems				
Cleaned and flushed:				
Suction				
Discharge				
Pressure tests				
Temporary piping screens in place				
Instrumentation and Controls				
Flowmeter FE2502F calibration				
Calibration Report No.				
Flow recorder FR2502G calibrated against transmitter				
VFD speed indicator calibrated against independent reference				
Discharge overpressure shutdown switch calibration				
Simulate discharge overpressure Shutdown				
FUNCTIONAL TESTS				
Mechanical				
Motor operation temperature satisfactory				
Pump operating temperature satisfactory				
Unusual noise, etc?				
Pump operation: 75 gpm/50 psig				
Measurement:				
Flow				
Pressure:	Test gage number:			
Alignment hot				
Dowelled in				
Remarks:				
Electrical				
Local switch function:				
Runs in *HAND*				
No control power in *OFF*				
Timer control in *AUTO*				
Overpressure protection switch PS2502C functional in both *HAND* and *AUTO*				
Overpressure protection switch PS2502C set at 75 psig				

PLC 2500 set at 24–hour cycle, 25 min *ON*				
OPERATIONAL TEST				
48–hour continuous test. Pump cycles as specified, indicators functional, controls functional, pump maintains capacity, overpressure protection remains functional, hour meter functional				

RECOMMENDED FOR BENEFICIAL OCCUPANCY

_____

Construction Manager_____ Date _____

ACCEPTED FOR BENEFICIAL OCCUPANCY

_____

Owner's Representative_____ Date _____

01730–A. OPERATION AND MAINTENANCE TRANSMITTAL FORM:

Date: _____
To: _____
_____
_____
_____
Attention: _____

Submittal No:[2] _____
Contract No: _____
Spec. Section: _____
Submittal Description: _____
From: _____
_____

Checklist	Contractor		Construction manager	
	Satisfactory	N/A	Accept	Deficient
1. Table of contents				
2. Equipment record forms				
3. Manufacturer information				
4. Vendor information				
5. Safety precautions				
6. Operator prestart				
7. Start–up, shutdown, and post-shutdown procedures				
8. Normal operations				
9. Emergency operations				
10. Operator service requirements				
11. Environmental conditions				
12. Lubrication data				
13. Preventive maintenance plan and schedule				
14. Troubleshooting guides and diagnostic techniques				
15. Wiring diagrams and control diagrams				
16. Maintenance and repair procedures				
17. Removal and replacement instructions				
18. Spare parts and supply list				
19. Corrective maintenance man–hours				
20. Parts identification				
21. Warranty information				
22. Personnel training requirements				
23. Testing equipment and special tool information				

[2]See paragraph 01300-4.0 A, Transmittal Procedure.

Remarks: _____

Contractor's Signature

01730–B. EQUIPMENT RECORD FORM:

EQUIP DESCRIP		EQUIP LOC	
EQUIP NO.	SHOP DWG NO.	DATE INST	COST
MFGR		MFGR CONTACT	
MFGR ADDRESS			PHONE
VENDOR		VENDOR CONTACT	
VENDOR ADDRESS			PHONE

MAINTENANCE REQUIREMENTS	D	W	M	Q	S	A	Hours
LUBRICANTS: RECOMMENDED:							
ALTERNATIVE:							
MISC. NOTES:							

RECOMMENDED SPARE PARTS			
PART NO	QUAN	PART NAME	COST

ELECTRICAL NAMEPLATE DATA			
EQUIP			
MAKE			
SERIAL NO.		ID NO.	
MODEL NO.		FRAME NO.	
HP	V	AMP	HZ
PH	RPM	SF	DUTY
CODE	INSL. CL	DES	TYPE
NEMA DES	C AMB	TEMP RISE	RATING
MISC.			
MECHANICAL NAMEPLATE DATA			
EQUIP			
MAKE			
SERIAL NO.		ID NO.	
MODEL NO.		FRAME NO.	
HP	RPM	CAP	SIZE
TDH	IMP SZ	BELT NO.	CFM
PSI	ASSY NO.	CASE NO.	
MISC			

01730–C. EQUIPMENT RECORD FORM:

EQUIP DESCRIP		EQUIP LOC	
EQUIP NO.	SHOP DWG NO.	DATE INST	COST
MFGR		MFGR CONTACT	
MFGR ADDRESS			PHONE
VENDOR		VENDOR CONTACT	
VENDOR ADDRESS			PHONE

MAINTENANCE REQUIREMENTS	D	W	M	Q	S	A	Hours

09900–A COATING SYSTEM INSPECTION CHECKLIST

Area or Structure to be coated: _____

Coating System (from paragraph 09900–2.01): _____

Date: _____

Contract Package No. _____

Coating Type _____

Coating System Manufacturer (CSM): _____

Coating System Applicator: _____

General Contractor: _____

Step 1: Completion of Cleaning and Substrate Decontamination Prior to Abrasive Blast Cleaning.

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 2: Installation of Protective Enclosure of Structure or Area and Protection of Adjacent Surfaces or Structures NOT TO BE COATED.

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 3: **Completion of Ambient Condition Control in Structure or Building Area and Acceptance of Ventilation System in Structure or Area as it applies to application and curing requirements for the coating system.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 4: **Completion of Surface Preparation for Concrete and Metallic Substrates to Be Coated.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 5: **Completion of Primer Application.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 6: **Completion of Concrete Repairs If Required and Related Surface Preparation Rework Prior to Coating System Application.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 7: **Completion of Concrete Filler/Surface Application to Concrete.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 8: **Completion of First Finish Coat Application and of Coating System Detail Treatment at Transitions or Terminations.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 9: **Completion of Second Finish Coat Application and of Coating System Detail Treatment at Transitions and Terminations.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 10: **Completion of Full and Proper Cure of Coating System.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 11: **Completion of Adhesion Testing of Cured Coating System on Concrete and Metallic Substrates and Acceptance of Holiday (Continuity) Testing of Coating System on Concrete and Metallic Substrates.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 12: **Completion of Localized Repairs to Coating System Following Adhesion and Continuity Testing.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

Step 13: **Final Acceptance of Coating System Installation Including Final Clean–Up of the Work Site Complying with Specification Requirements and the CSM's Quality Requirements.**

Representing	Name	Signature	Date
Contractor			
Coating System Applicator			

11000–A. MANUFACTURER'S INSTALLATION CERTIFICATION FORM:

Contract No: _____ Specification section: _____

Equipment name: _____

Contractor: _____

Manufacturer of equipment item: _____

The undersigned manufacturer of the equipment item described above hereby certifies that he has checked the installation of the equipment and that the equipment, as specified in the project manual, has been provided in accordance with the manufacturer's recommendations, and that the trial operation of the equipment item has been satisfactory.

Comments: _____

_____

_____

_____

_____

_____ _____

Date Manufacturer

_____

Signature of Authorized Representative

_____ _____

Date Contractor

_____

Signature of Authorized Representative

11000–B. MANUFACTURER'S INSTRUCTION CERTIFICATION FORM:

Contract No: _____ Specification section: _____

Equipment name: _____

Contractor: _____

Manufacturer of equipment item: _____

The undersigned manufacturer certifies that a service engineer has instructed the wastewater treatment plant operating personnel in the proper maintenance and operation of the equipment designated herein.

Operations Check List (check appropriate spaces)	
Start–up procedure reviewed	
Shutdown procedure reviewed	
Normal operation procedure reviewed	
Others:	
Maintenance Check List (check appropriate spaces)	
Described normal oil changes (frequency)	
Described special tools required	
Described normal items to be reviewed for wear	
Described preventive maintenance instructions	
Described greasing frequency	
Others:	

_____ _____
Date Manufacturer

_____
Signature of Authorized Representative

_____ _____
Date Signature of Owner's Representative

_____ _____
Date Signature of Contractor's Representative

11000–C. UNIT RESPONSIBILITY CERTIFICATION FORM

(Project Title)

CERTIFICATE OF UNIT RESPONSIBILITY
for Specification Section _____

_____
(Section title)

In accordance with paragraph 11000–1.02 C of the contract documents, the undersigned manufacturer of driven equipment ("manufacturer") accepts unit responsibility for all components of equipment furnished to the Project under specification Section_____ ,_and for related equipment manufactured under Sections_____, _____, and _____ .

We have reviewed the requirements for Sections 11000 (and 11050 where applicable) and all sections referencing this (these) section(s), including but not limited to drivers, supports for driving and driven equipment and all other specified appurtenances to be furnished to the Project by manufacturer. And, we have further reviewed, and modified as necessary, the requirements for associated variable speed drives and motor control centers. We hereby certify that all specified components are compatible and comprise a functional unit suitable for the specified performance and design requirements whether or not the equipment was furnished by us. We will make no claim nor establish any condition that problems in operation for the product provided under this specification Section _____ are due to incompatibility of any components covered by this Certificate of Unit Responsibility. Nor will we condition or void any warranty for the performance of the product of this specification Section _____ due to incompatibility of any components covered under this Certificate of Unit Responsibility.

Our signature on this Certificate of Unit Responsibility does not obligate us to take responsibility for, nor to warrant the workmanship, quality, or performance of related equipment provided by others under specification Sections _____, _____, and _____. Our obligation to warranty all equipment provided by us shall remain unaffected.

_____
Notary Public

_____
Commission expiration date

Seal:

_____
Name of Corporation

_____
Address

By: _____
Duly Authorized Official

_____
Legal Title of Official

Date: _____

11002–A. RIGID EQUIPMENT MOUNT INSTALLATION CHECKLIST

(CLIENT, PROJECT NAME)

Equipment Tag No.: _____ Date: _____

Grout Product Name and Type: _____

Grouting System Manufacturer: _____

Grouting Application Contractor: _____

General Contractor: _____

Step 1: Verify Equipment Anchor Installation Conformance to Equipment Pad Details

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Name: _____
Construction Manager Millwright

Step 2: Completion of Cleaning and Concrete Substrate Preparation Prior to Grouting

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Name: _____
Construction Manager Grouting Contractor Rep.

Name: _____
Grout Manufacturer's Technical Rep.

Step 3: Equipment Leveling.

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Name: _____
Construction Manager Millwright

Step 4: **Installation of Protection of Adjacent Surfaces or Structures NOT TO BE GROUTED**

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Name: _____
Construction Manager Grouting Contractor Rep.

Name: _____
Grout Manufacturer's Technical Rep.

Step 5: **Preparation and Construction of Forms and Epoxy Grout Filling Standpipes**

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Name: _____
Construction Manager Grouting Contractor Rep.

Name: _____
Grout Manufacturer's Technical Rep.

Step 6: **Completion of Ambient Condition Control in Structure or Building Area and Acceptance of Ambient Conditions as They Apply to Application and Curing Requirements for the Grouting System**

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Date___/___/___
Grouting Contractor Rep.

Name: _____ Date___/___/___
Grout Manufacturer's Technical Rep.

Name: _____ Date___/___/___
Construction Manager

Step 7: Epoxy Grout Installation

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Name: _____
Construction Manager Grouting Contractor Rep.

Name: _____
Grout Manufacturer's Technical Rep.

Step 8: Completion of Full and Proper Cure of Epoxy Grout

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Date___/___/___
Grouting Contractor Rep.

Name: _____ Date___/___/___
Grout Manufacturer's Technical Rep.

Name: _____ Date___/___/___
Construction Manager

Step 9: Completion of Localized Repair of Grout Voids

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Date___/___/___
Grouting Contractor Rep.

Name: _____ Date___/___/___
Grout Manufacturer's Technical Rep.

Name: _____ Date___/___/___
Construction Manager

Step 10: **Final Acceptance of Grouting System Installation Including Final Clean–Up of the Work Site Complying with All Specification Requirements and the GSM's Quality Requirements**

Name: _____ Date___/___/___
Contractor Rep.

Name: _____ Date___/___/___
Grouting Contractor Rep.

Name: _____ Date___/___/___
Grout Manufacturer's Technical Rep.

Name: _____ Date___/___/___
Construction Manager

11060–A. MOTOR DATA FORM:

Equipment Name_____ Equipment No(s) _____

Project Site Location _____

Nameplate Markings

Mfr:		Mfr Model:		Frame:		Horsepower:	
Volts:		Phase:		RPM:		Service Factor:	
FLA:		LRA:		Frequency:		Amb Temp Rating:	°C
Time rating:				Design Letter:			
	(NEMA MG1–10.35)				(NEMA MG–1.16)		
KVA Code Letter:				Insulation Class:			

The following information is required for explosion–proof motors only:

A. Approved by UL for installation in Class _____, Div _____, Group _____

B. UL frame température code ____ (NEC Tables 500–8B)

The following information is required for all motors 1/2 horsepower and larger:

A. Guaranteed minimum efficiency _____
(Paragraph 11060–2.04 G)

B. Nameplate or nominal efficiency _____

Data Not Necessarily Marked on Nameplate

Type of Enclosure:			Enclosure Material:		
Temp Rise:	°C (NEMA MG1–12.41,42)				
Space Heater included?	☐ Yes	☐ No	If Yes:	Watts	Volts
Type of motor winding over–temperature protection, if specified:					

Provide information on other motor features specified:

_____

16000–A. WIRE AND CABLE RESISTANCE TEST DATA FORM:

Wire or Cable No.:_____ Temperature, °F _____

Location of Test	Insulation resistance, megohms
1.	
2.	
3.	
4.	
5.	
6.	
7	

.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

16000–B. INSTALLED MOTOR TEST FORM:

Motor Equipment Number _____ Date of test _____

Equipment Driven _____

MCC Location _____

				Ambient temp	°F
Resistance:					
Insulation resistance phase–to–ground megohms:					
Phase A		Phase B		Phase C	
Current at Full Load:					
Phase		Current, amps			
Phase		Current, amps			
Phase		Current, amps			
Thermal Overload Device:	Manufacturer/catalog #		Amperes		
Circuit breaker (MCP) setting:					

Motor Nameplate Markings:

Mfr		Mfr Model		Frame		HP	
Volts		Phase		RPM		Service factor**	
Amps		Freq		Ambient temp rating			°C
Time rating			Design letter**				
	(NEMA 1–10.35)			(NEMA MG–1.16)			
Code letter			Insulation class				

**Required for 3–phase squirrel cage induction motors only.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

16000–C. DRY TRANSFORMER TEST DATA FORM:

(Note: Use Data Form for dry type transformers with voltage rating of 600 Vac or less and sizes to 167 kVA single phase and 500 kVA three phase. Use NETA Test Forms and Test Procedures for higher voltages and larger transformers.)

Equipment Tag No.: _____ Temperature Rating: _____

Description/Location: _____ Feeder size/Source: _____

Primary Voltage: _____ Secondary Voltage: _____ Winding Connection: _____

A. VISUAL INSPECTION

Transformer Inspection	Pass	Fail	Note
1. Nameplate data as specified			
2. Mechanical condition			
a. Free of dents and scratches			
b. Anchored properly			
c. Shipping brackets removed			
d. Spacing from wall per nameplate			
3. Grounding *			
a. Equipment grounding			
b. System grounding			

B. INSULATION–RESISTANCE TESTS:

Perform tests with calibrated megohmeter. Apply 1000 Vdc test voltage for 60 seconds and record readings in megohms at 30–seconds and 60–seconds intervals.

Test Group	Resistance between		30–second reading	60–second reading	Absorption Ratio Index 60–sec. / 30–sec.
Primary Winding to ground	A	GRD			
	B	GRD			
	C	GRD			
Secondary Winding to ground with * N–G Bond removed	a	GRD			
	b	GRD			
	c	GRD			
Primary Winding to Secondary Winding	A	a			
	B	b			
	C	c			

Submit resistance readings to the Construction Manager immediately after the tests that are less than the manufacturer's recommended value or less than 10–megohms. Record the Absorption Ratio Index values for future reference. Ratio must be 1.0 or greater, with infinity (∞) equal to 1.0.

Contractor Representative Certified: _____ Date _____

Owner Representative Witnessed: _____ Date _____

16000–D. MOTOR CONTROL CENTER TEST FORM:

Equipment No. _____ Ambient room temperature _____

Location _____

A. MECHANICAL CHECK:

All bolted connections either bus to bus or cable to bus shall be torqued to the manufacturer's recommendations.

B. ELECTRICAL TESTS:

1. Measure insulation resistance of each bus section phase to phase and phase to ground for 1 minute using a megohmmeter at 1000 volts.

Test results (megohms)			
Phase		Phase	
A–GRD		A–B	
B–GRD		B–C	
C–GRD		C–A	

2. Set the circuit breaker in the starter unit to comply with the requirements of NEC, Article 430–52 and Table 430–152.

3. Motor overload heater elements shall be sized and installed based on the actual nameplate full load amperes of the motor connected to the starter.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

16000–E. MEDIUM VOLTAGE MOTOR STARTER TEST FORM:

Equipment No. _____

Location _____

Room Temperature _____

The protective devices shall be set in accordance with the specification before the tests are performed.

1. Measure contact resistance (micro–ohms)

Phase:	A		B		C	

Contacts shall be replaced if resistance exceeds 50 micro–ohms.

2. Perform an insulation resistance test (1000 volts DC for 1 minute).

Phase	A		B		C		
Pole to ground							megohms
Across open pole							megohms
Pole to pole	AB		BC		CA		megohms

3. Perform minimum pickup voltage tests on trip and close coils.

4. Motor RTDs shall be tested by using a hot oil bath. The temperature at which the sensor trips shall be recorded for each RTD.

5. The Contactor shall be tripped by operation of each protective device.

16000–F. MEDIUM VOLTAGE SWITCHGEAR TEST FORM:

Equipment No. _____

Location _____

Room Temperature _____

The protective devices shall be set in accordance with the specification before the tests are performed.

1. Measure contact resistance (micro–ohms)

Phase:	A		B		C	

Contacts shall be replaced if resistance exceeds 50 micro–ohms.

2. Perform an insulation resistance test (1000 volts DC for 1 minute).

Phase	A		B		C		
Pole to ground							megohms
Across open pole							megohms
Pole to pole	AB		BC		CA		megohms

3. Perform minimum pickup voltage tests on trip and close coils.

4. Verify the instrument transformer ratios. Check the transformer's polarity electrically.

5. The Contactor shall be tripped by operation of each protective device.

16000–G. PROTECTIVE RELAY TEST FORM:

Location _____

Switchgear Breaker No. _____

Protective Relay Description _____

The protective relays shall be tested in the following manner:

1. Each protective relay circuit shall have its insulation resistance tested to ground.

2. Perform the following tests on the specified relay setting:

   a. Pickup parameters on each operating element.

   b Timing test shall be performed at three points on the time dial curve.

   c. Pickup target and seal-in units.

The results shall be recorded and signed. A copy shall be given to the Construction Manager in accordance with paragraph 16000–1.05 B.

16000–H. LOW VOLTAGE SWITCHGEAR TEST FORM:

Equipment No. _____

Location _____

Room Temperature _____

The protective devices shall be set in accordance with the specification before the tests are performed.

1. Measure contact resistance (micro–ohms)

Phase:	A		B		C	

Contacts shall be replaced if resistance exceeds 50 micro–ohms.

2. Perform an insulation resistance test (1000 volts DC for 1 minute).

Phase	A		B		C		
Pole to ground							megohms
Across open pole							megohms
Pole to pole	AB		BC		CA		megohms

3. Minimum pickup current shall be determined by primary current injection.

4. Long time delay shall be determined by primary injection at three hundred percent (300%) pickup current.

5. Short time pickup and time delay shall be determined by primary injection of current.

6. Instantaneous pickup current shall be determined by primary injection.

7. Trip unit reset characteristics shall be verified.

8. Auxiliary protective devices, such as ground fault or under voltage relays, shall be activated to ensure operation of shunt trip devices.

16000–I. MEDIUM VOLTAGE LOAD INTERRUPTER SWITCH TEST FORM:

Equipment Number _____

Location _____

Date _____

1. Measure switch blade resistance (micro–ohms).

Phase:	A		B		C	

Contacts shall be replaced if resistance exceeds 50 micro–ohms.

2. Perform an insulation resistance test (1000 volts DC for 1 minute).

Phase	A		B		C		
Pole to ground							megohms
Across open pole							megohms
Pole to pole	AB		BC		CA		megohms

The results shall be recorded and signed. A copy shall be given to the Construction Manager in accordance with paragraph 16000–2.06 B.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

16000–J. LIQUID–FILLED TRANSFORMER TEST FORM:

Equipment Number _____

Location _____

Date/Weather Conditions _____

A. Perform the "Insulation–Resistance Test" and "Dielectric Absorption Test" using Form 16000–C, Dry Transformer Test Data Form.

B. Perform an applied voltage (low frequency dielectric) test in accordance with ANSI C57.12.90, paragraph 10.5, Applied Voltage Test. Applied voltage levels shall be 75 percent of recommended factory test levels or recommended test levels of ANSI C57.12.00, Table 5.

C. Insulating oil shall be sampled and shall be laboratory tested for the following:

1. Dielectric strength.
2. Acid neutralization.
3. Interfacial tension.
4. Color.
5. Power factor.

D. Perform a turns ratio test between the windings for all tap positions.

E. The temperature and pressure switches shall be tested using a hot oil bath and air pump.

The results shall be recorded and signed by the Contractor and Construction Manager. A copy shall be given to the Construction Manager in accordance with paragraph 16000–2.06 D. Any readings which are abnormal to ANSI industry standards shall be reported to the Construction Manager.

16000–K. AUTOMATIC TRANSFER SWITCH TEST FORM:

Equipment Number _____

Location _____

Date _____

1. Perform an insulation resistance test (1000 volts DC for 1 minute):

Phase	A		B		C		
Pole to ground							megohms
Pole to pole	AB		BC		CA		megohms

2. Perform the following operations and initial:

   a. Manual transfer _____

   b. Loss of normal power; __sec delay

   c. Return to normal power; _____sec delay

The results shall be recorded and signed. A copy shall be given to the Construction Manager in accordance with paragraph 16000–2.06 B.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

16000–L. NEUTRAL GROUNDING RESISTOR TEST:

Equipment No. _____

Location _____

The pickup and time delay setting on the ground fault relay shall be set in accordance with Section 16431.

1. The transformer neutral insulation resistance shall be measured with and without the grounding resistor connected to insure no parallel ground paths exist.

2. The protective relay pickup current shall be determined by injecting test current into the current sensor. The pickup current should be within 10 percent of the dial setting. Record the dial setting and actual pickup tie.

3. The relay timing shall be tested by injecting 150 and 300 percent of pickup current into the current sensor. The relay timing shall be in accordance with the manufacturer's published time–current characteristic curves. Record the relay timing at 150 and 300 percent of pickup current.

4. The circuit interrupting device shall be operated by operating the relay.

The results shall be recorded and signed by the Contractor and Construction Manager. A copy shall be given to the Construction Manager in accordance with paragraph 16000–2.06 B.

17000–A. LOOP WIRING AND INSULATION RESISTANCE TEST DATA FORM:

Loop No.: _____

List all wiring associated with a loop in table below. Make applicable measurements as indicated after disconnecting wiring.

Wire No.	Panel Tie	Field TB	Continuity Resistance [a]		Insulation Resistance[b]			
			Cond./ Cond.	Cond./ Shield	Shield/ Gnd.	Shield/ Cond.	Cond./ Gnd.	Shield/ Shield
A			—	(A/SH)				
B			(A/B)	—				
C			(A/C)	—				
D			(A/D)	—				
etc.								

NOTES:

a. Continuity Test. Connect ohmmeter leads between wires A and B and jumper opposite ends together. Record resistance in table. Repeat procedure between A and C, A and D, etc. Any deviation of ±2 ohms between any reading and the average of a particular run indicates a poor conductor, and corrective action shall be taken before continuing with the loop test.

b. Insulation Test. Connect one end of a 500 volt megger to the panel ground bus and the other sequentially to each completely disconnected wire and shield. Test the insulation resistance and record each reading.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–B. CONTROL CIRCUIT PIPING LEAK TEST FORM:

Loop No.:_____

List tubing associated with loop in table below. Make applicable measurements after isolating any air consuming pilots from circuit.

Tube No.	Tubing Equivalent Length of 1/4–Inch Copper[a]	Test Period (seconds)	Permitted Pressure Drop (psi)[b]	Measured Pressure Drop (psi)
A				
B				
C				
D				
Etc.				

NOTES:

a. Convert actual tubing and air motor volume to equivalent 1/4–inch copper tubing.

b. Pressure drop shall not exceed 1 psi per hundred feet 1/4–inch tubing per 5 seconds.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–C. CONTROLLER CALIBRATION TEST DATA FORM:

Tag No. and Description: _____

Make & Model No.: _____ Serial No.: _____

Input: _____ Process Variable (PV) Scale: _____

Output: _____ Output Scale: _____

PV Scale Calibration

% of Range	Input	Expected Reading	Actual Reading	% Deviation
0				
50				
100				
			% Deviation Allowed:	

Connect output to PV for following tests:

Set Point (SP) Indicator Accuracy			Output Meter Accuracy			Controller Accuracy		
SP	PV Reading	Expected % Dev.	Actual Reading	Expected Reading	Actual % Dev.	Output	Output	% Dev.
(0%)								
(50%)								
(100%)								
% Deviation Allowed:				% Deviation Allowed:			% Deviation Allowed:	

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–D. PANEL INDICATOR CALIBRATION TEST DATA FORM:

Tag No. and Description: _____

Make & Model No.:_____ Serial No.:_____

Input: _____

Scale: _____ Range: _____

PV Scale Calibration

% of Range	Input	Expected Reading	Actual Reading	% Deviation
0				
50				
100				
			% Deviation Allowed:	

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–E. RECORDER CALIBRATION TEST DATA FORM:

Tag No. and Description: _____

Make & Model No.: _____ Serial No.: _____

Input: _____ Chart: _____

Scale: _____ Range: _____

% of Range	Input	Expected Reading	Actual Reading	% Deviation
0				
50				
100				
			% Deviation Allowed:	

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–F. SIGNAL TRIP CALIBRATION TEST DATA FORM:

Tag No. and Description: _____

Make & Model No.: _____ Serial No.: _____

Input: _____

Scale: _____ Range: _____

Set Point(s): _____

After setting set point(s), run signal input through entire range and calculate deadband.

Set Point	Incr. Input Trip Point	Decr. Input Trip Point	Calc. Deadband	Required Deadband

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–G. FIELD SWITCH CALIBRATION TEST DATA FORM:

Tag No. and Description: _____

Make & Model No.: _____ Serial No: _____

Input: _____

Range: _____

Set Point(s): _____

Simulate process variable (flow, pressure, temperature, etc.) and set desired set point(s). Run through entire range of switch and calculate deadband.

Set Point	Incr. Input Trip Point	Decr. Input Trip Point	Calc. Deadband	Required Deadband

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–H. TRANSMITTER CALIBRATION TEST DATA FORM:

Tag No. and Description: _____

Make & Model No.: _____ Serial No.: _____

Input: _____

Output: _____

Range: _____ Scale: _____

Simulate process variable (flow, pressure, temperature, etc.) and measure output with appropriate meter.

% of Range	Input	Expected Reading	Actual Reading	% Deviation
0				
50				
100				
			% Deviation Allowed:	

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–I. MISCELLANEOUS INSTRUMENT CALIBRATION TEST DATA FORM:

(For instruments not covered by any of the preceding test forms, the Contractor shall create a form containing all necessary information and calibration procedures.)

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–J. INDIVIDUAL LOOP TEST DATA FORM:

Loop No.: _____

Description: (Give complete description of loop's function using tag numbers where appropriate.)

P&ID No.: (Attach copy of P&ID.)

a. Wiring tested:
(Attach test form 17000–A)

b. Instrumentation tubing/piping tested:
(Attach test form 17000–B)

c. Instruments calibrated:
(Attach test forms 17000–C through I)

d. List step–by–step procedures for testing loop parameters. Test loop with instruments, including transmitters and control valves, connected and functioning. If it is not possible to produce a real process variable, then a simulated signal may be used with the Construction Manager's approval.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

17000–K. LOOP COMMISSIONING TEST DATA FORM:

Loop No.: _____

a. Loop tested:
(Attach test form 17000–J)

b. Controlled or connected equipment tests confirmed:

c. Give complete description of loop's interface with process.

d. With associated equipment and process in operation, provide annotated chart trace of loop response to changes in set points for verification of performance. This chart should demonstrate 1/4–amplitude damping as output adjusts to set point change. Show set points, starting and finishing times on chart, as well as any other pertinent data.

Connect 2–pen recorder to process variable (PV) and to controller output. Use 1 inch/second chart speed.

Pen 1 – PV – Connections:

Pen 2 – Output – Connections:

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

INDEX TO

SECTION 02 30 00

SUBSURFACE INVESTIGATION

SECTION 02 30 00

SUBSURFACE INVESTIGATION

PART 1 – GENERAL

1.01 DESCRIPTION

A. This section includes subsurface data logs for information only.

1.02 SOIL INVESTIGATION DATA

A. Subsurface data logs and geotechnical report are available for information only. Actual conditions may vary. If bidders are not satisfied with accuracy and completeness of all available data, they are at liberty to make borings or perform soil investigation work for their own use at its expense. If Contractor chooses to perform his own investigation, work shall be coordinated with the Owner and paid for by the Contractor. Any results from Contractor's investigation shall be shared promptly with the Owner and Engineer. Owner reserves the right to share Contractor's investigation data with other potential bidders if information could affect bidding process.

B. The boring logs and test results are for information of the Contractor. Owner and Engineer assume no responsibility for the information.

PART 2 – PRODUCTS

2.01 GEOTECHNICAL REPORT

A. See attached geotechnical report, completed by Terracon, and dated March 15, 2018, project number ES185011.

PART 3 – EXECUTION

None this Section.

END OF SECTION

INDEX TO

SECTION 02 41 13

SELECTIVE SITE DEMOLITION

SECTION 02 41 13

SELECTIVE SITE DEMOLITION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions apply to work of this section. The existing treatment plant drawings will be provided to contractors to help in locating the piping and other structures. However, these drawings are provided as information only. There may be other underground utilities which contractor may encounter that needs to be removed from the site and shall be included in the lump sum contract.

1.02 DESCRIPTION OF WORK

A. Extent of selective demolition work is indicated on drawings.

B. Adhere to all Georgia EPD standards and requirements.

1.03 SUBMITTALS

A. Schedule: Submit schedule indicating proposed methods and sequence of operations for selective demolition work to Owner's representative for review prior to commencement of work. Include coordination for shut–off, capping, and continuation of utility services as required, together with details for dust and noise control protection. Include schedule and location for return of any items identified on plans that are to be delivered to Owner.

1.04 JOB CONDITIONS

A. Condition of Structures: Owner assumes no responsibility for actual condition of items to be demolished.

B. Partial Demolition and Removal: Items designated for removal shall be removed as work progresses. Transport salvaged items from site as they are removed. Storage or sale of removed items on site shall not be permitted.

C. Protections: Provide temporary barricades and other forms of protection as required to protect Owner's personnel and general public from injury due to selective demolition work.

D. Protect all existing structures that are designated to remain throughout demolition operations. Remove protections at completion of work.

1.05 DAMAGES

A. Promptly repair damages caused to adjacent facilities by demolition work at no cost to Owner.

1.06 TRAFFIC

A. Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

B. Do not close, block or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways.

1.07 EXPLOSIVES

A. Use of explosives will not be permitted.

1.08 UTILITY SERVICES

A. Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations.

B. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.

1.09 ENVIRONMENTAL CONTROLS & SPECIAL MATERIAL HANDLING

A. Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.

B. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

C. *Contractor shall survey the existing site for possible asbestos and any other hazardous materials before start of the demolition. In case of any special handing material presence, the contractor shall remove the material in accordance to the GA. EPD requirements. The cost shall be included in the lump sum contract.*

1.10 MEASUREMENT AND PAYMENT

A. There will be no measurement for selective demolition. Payment will be made at the contract lump sum price. Payment will include equipment, labor, materials, protection, clean–up, disposal, and all work necessary to complete the selective demolition shown on the construction drawings.

PART 2 – PRODUCTS

None in this section

PART 3 – EXECUTION

3.01 PREPARATION

A. Prior to commencement of selective demolition work, check areas in which work will be performed. Photograph or video existing conditions of surfaces, equipment, or surrounding properties that could be misconstrued as damage resulting from selective demolition work. Review items of concern onsite with Owner and Engineer. File with Owner or Engineer prior to starting work.

B. Cover and protect equipment and fixtures to remain from soiling or damage when demolition work is performed in areas from which such items have not been removed.

3.02 DEMOLITION

A. Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on the plans in accordance with demolition schedule and governing regulations.

B. *As indicated on plans all underground utilities including water & sewer lines, power cable and conduits, concrete & wooden piles, manhole, all other structures, and foundations shall be removed to depth of not less than 10 ft.* ***where new piling is to be driven over the existing structures (clarifiers, thickeners, wetwell, etc.) the entire bottom concrete slab (regardless of depth of the slab) must be completely remove.***

C. Demolish concrete in small sections. Cut concrete at junctures with construction to remain using power–driven masonry saw or hand tools. Do not use power–driven impact tools. All spoiled concrete, metals, pipes, rebars, and other building materials shall be properly removed from site and disposed of in according to EPD requirements.

D. Completely fill below–grade areas and voids resulting from demolition work. Provide fill consisting of approved earth, gravel and sand, free of trash and debris, stones over two-inch diameter, roots, or other organic matter.

E. If unanticipated mechanical, electrical, or structural elements, which conflict with intended function or design, are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner in written, accurate detail. Pending receipt of directive from Owner, rearrange selective demolition schedule as necessary to continue overall job progress without delay.

3.03 SALVAGE MATERIALS

A. All equipment and materials desired by Owner shall be delivered to a designated location, not further than two miles from the job site. Desired equipment may include, but not be limited to, generator, transfer switch, pumps, motors, controls, valves, electrical panels, and other items.

B. Any articles of historic significance will remain the property of the Owner. Notify Owner immediately if such items are encountered. Stop demolition or excavation work and obtain acceptance regarding further historical investigation, method of removal or salvage for Owner.

3.04 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove debris, rubbish and other materials resulting from demolition operations from site. Transport and legally dispose of materials off site.

B. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.

C. Burning of removed materials is not permitted on project site.

3.05 CLEAN–UP AND REPAIR

A. Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protections and leave site clean.

B. Repair demolition performed in excess of required work. Return structures and surfaces to remain to the condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

C. Fill in all voids created by selective demolition and grade site to drain. Grass all disturbed areas for erosion control.

END OF SECTION

INDEX TO

SECTION 03 00 00

CONCRETE DEFINITIONS AND REFERENCE CODES, SPECIFICATIONS AND STANDARDS

SECTION 03 00 00

CONCRETE DEFINITIONS AND REFERENCE CODES, SPECIFICATIONS AND STANDS

PART 1 – GENERAL

1.01 PURPOSE

A. The purpose of this Section is to provide the Contractor with a list of applicable codes, definitions, specifications, and standards associated with the Division 03 Specifications.

1.02 SCOPE

A. These definitions and references apply to concrete materials.

1.03 DEFINITIONS

A. Active Cracks: Those cracks for which the mechanism causing the cracking is still at work. An active crack is any crack that is still active.

B. Architectural Concrete: Concrete that is exposed as an interior or exterior surface in the completed structure that contributes to visual character of the completed structure, as indicated on Drawings.

C. Architectural Finish: Produce architectural finishes including special textured finishes, exposed aggregate finish, and aggregate transfer finish.

D. As–Cast Finishes: Use form facing materials meting requirements of ACI 301. Also known as rough–form, smooth–form, or architectural finishes. No coating.

E. Basin Train: Series of interconnected basins that will be operated as a unit with the same water level.

F. Bleed: The autogenous flow of mixing water within, or its emergence from, newly placed grout caused by the settlement of the solid materials within the mass, also called water gain.

G. Brooming: Use for exposed exterior walking surfaces, loading docks, ramps, and outside paving.

H. Chemical Grout: Any grouting material characterized by being a true solution with no particles in suspension. In the context of this document, the term "chemical grout" will be further restricted to referring to a flexible polymer such as a polyurethane, capable of expanding pond contact with water.

I. Clear Sealer: Compound use on new or existing concrete and cementitious toppings to improve resistance to staining, abrasion and the effects of ultraviolet (UV) radiation.

J. Coated Concrete: As cast concrete requiring an additional application of coating.

K. Codes: Legal documents whose use is determined by the jurisdictions governing the project. Codes are typically geographically dependent.

L. Cold Weather: A period when for more than 3 successive days the average daily outdoor temperature drops below 40 degrees F. The average daily temperature is the average of the highest and lowest temperature during the period from midnight to midnight. When temperatures above 50 degrees F occur more than half of any 24–hour period, that period shall no longer be regarded as cold weather.

M. Consistency: The relative mobility or ability to flow.

N. Crack: Complete or incomplete separation of concrete into two or more parts produced by breaking or fracturing.

O. Crack Injection: Method of sealing or repairing cracks by pressure injecting a polymer.

P. Curing Compound: A liquid that is sprayed or otherwise applied to newly placed concrete which retards the loss of water during curing.

Q. Defective Areas: Surface defects that include honeycomb, rock pockets, indentations greater than 3/16–inch, cracks 0.005–inch wide and larger, as well as a crack that leaks for liquid containment basins and below grade habitable spaces; cracks 0.010–inch wide and larger in nonfluid holding structures spalls, chips, air bubbles greater than 3/4–inch in diameter, pinholes, bug holes, embedded debris, lift lines, sand lines, bleed lines, leakage from joints, fins and other projections, form popouts, texture irregularities, and stains and other color variations that cannot be removed by cleaning.

R. Dry Pack: A natural aggregate, high strength, non–shrink material designed specifically for mixing and placing at a no slump consistency. When mixed with a minimum of water, it can be placed into voids and spaces where forming or containment of self–leveling grouts is not possible or desirable.

S. Epoxy Grout: Rigid polymer resin capable of restoring the structural integrity of a concrete section.

T. Evaporation Retardant: A water–based compound that is specifically designed to form a thin monomolecular film to reduce rapid moisture loss from the concrete surfaces prior to curing.

U. Exposed Concrete: Concrete surfaces that can be seen inside or outside of structures regardless whether concrete is above water, dry at all times, or can be seen when structure is drained.

V. Floating: Use for surfaces scheduled to receive roofing, waterproofing membranes, etc.

W. Formed Finishes:

1. Rubbed Finishes: Remove forms as early as permitted by ACI 301 and produce smooth–rubbed, grout cleaned, or cork floated finish.

2. Rough-form Finish (F-1): Patch tie-holes and defects. Chip or rub off fins exceeding 1/2 inch in height. Leave surfaces with the texture imparted by the forms.

3. Smooth-form Finish (F-2): Patch tie holes and defects. Remove fins exceeding 1/8 inch in height.

4. Smooth Form Finish Prepared for Cementitious Coating (F-4): Same as F-2 except follow cementitious coating manufactures written instructions for surface preparation.

5. Smooth Form Finish Prepared for painting (F-5): Same as F-2 except follow paint manufacturers written instructions for surface preparation.

6. Smooth-rubbed Finish (F-7): Remove forms as early as permitted by ACI 301 and perform necessary patching. Produce finish on hardened concrete no later than the day following formwork removal. Wet the surface and rub it with carborundum brick or other abrasive until uniform color and texture are produced. Use no cement or grout other than cement paste drawn from the concrete itself by the rubbing process.

X. Green Concrete: Concrete that has set but not hardened.

Y. Hardener: Concrete hardeners are silicate-based penetrating sealers. They react with soluble calcium compounds (free lime) in the concrete and form insoluble calcium silicates to create a breathable protective barrier.

Z. Hot Weather: Any combination of the following conditions that tends to impair the quality of freshly mixed or hardened concrete by accelerating the rate of moisture loss and rate of cement hydration, or otherwise causing detrimental results:

1. High ambient temperature.

2. High concrete temperature.

3. Low relative humidity.

4. Wind speed.

5. Solar radiation.

AA. Hydraulic Structures: Liquid containment basins.

BB. ICC-ES Reports: Published by ICBO for concrete anchor manufacturers.

CC. Inspection: Observation of Work by Inspector for conformance to approved design Drawings and Specifications.

DD. Inspector: Qualified person who shall demonstrate competence, to satisfaction of

building official, for inspection of Work specified within this section.

EE. Large Cracks: Wider than 0.015 inch.

FF. Low–Pressure Mortar: Mortar applied by low–pressure spraying or in small areas by hand troweling.

GG. New Concrete: Concrete that is less than 60 days old.

HH. Nonshrink Grout: Prepackaged dry hydraulic cement product intended for use under applied load intended to support a structure, a machine and the like where a change in height below initial placement height is to be avoided.

II. Nonstructural Defect:

1. Areas with defects that meet the following:

a. Deemed by Design/Build Contractor to be superficial.

b. Less 1 inch in depth.

c. Not subjected to structural loads or heavy wear.

JJ. Pointing: To place plastic grout into joints to correct defects or to completely fill joints in newly poured concrete.

KK. Regulations: Legal design standards that must be incorporated into the design.

LL. Seeding: Select aggregate is carefully placed by shovel or hand to completely cover the entire surface with one layer of stone.

MM. Segregation: The unintentional separation of the constituents of grout causing a lack of uniformity in distribution.

NN. Slurry Concrete: Mixture of sand, 3/8–inch minus aggregate, cement, and water for wall construction joints and pre–stressed concrete reservoir wall base.

OO. Small Cracks: Width equal to 0.015 inch or less.

PP. Spall: A fragment detached from a larger mass.

QQ. Spalling: A development of spalls.

RR. Standards: Opinions and recommendations that form design guidelines that are not legal in nature but are considered to be standard of practice." Standards are often published by industry associations but may also be internal or client–developed.

SS. SS. Structural Defect: Condition or characteristic that detracts from appearance, strength, or durability of concrete. Structural defects may be in the following areas:

1. Areas subject to structural loading.

2. Areas subject to heavy wear.

3. Interior of hydraulic structure.

4. Below grade structure.

5. Display defect or parts of defect that extend 1 inch or deeper into the concrete and deemed by the Design/Build Contractor as a structural defect.

TT. Troweling: Use for exposed interior walking surfaces and surfaces to be covered with carpet, resilient flooring, paint and other thin film finishes.

UU. Unformed Finishes:

1. Trowel Finish (U–I): Float concrete finish, 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 trowelled. Tolerance for concrete floors shall be conventional straight edged tolerance in accordance with ACI 117 unless otherwise specified. Provide hard, smooth surface uniform in appearance and texture.

2. Float Finish (U–2): Place, consolidate, strike off, and level concrete, eliminating high spots and low spots. Power float and/or hand float surface.

3. Broom Finish (U–5): Immediately after concrete has received a floated finish, give the concrete surface a coarse transverse scored texture by drawing a broom across the surface.

4. Sidewalk Finish (U–6): Same as U–5.

1.04 REFERENCES

A. The following is a list of codes, specifications, and standards that may be referenced in this section:

1. American Concrete Institute (ACI):

a. 117/117R, Standard Tolerances for Concrete Construction and Materials.

b. 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

c. 301, Specifications for Structural Concrete.

d. 302.1R, Guide for Concrete Floor and Slab Construction.

e. 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.

f. 305R, Hot Weather Concreting.

g. 306.1, Standard Specification for Cold Weather Concreting.

h. 309R, Guide for Consolidation of Concrete.

i. *318/318R,* Building Code Requirements for Structural Concrete and Commentary.

j. 347, Guide to Formwork for Concrete.

k. 503R, Use of Epoxy Compounds with Concrete.

l. 506, Guide to Shotcrete.

m. 506.2, Specification for Shotcrete.

n. 506.3, Guide to Certification of Shotcrete Nozzlemen.

o. 506.4, Guide for the Evaluation of Shotcrete.

p. SP–66, Detailing Manual.

2. ASTM International (ASTM):

a. A36, Standard Specification for Structural Steel.

b. A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

c. A185, Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.

d. A416, Standard Specification for Steel Strand, Uncoated SevenWire for Prestressed Concrete.

e. A497, Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.

f. *A615/A615M,* Standard Specification for Deformed and Plain Billet–Steel Bars for Concrete Reinforcement.

g. *A706/A706M, Standard Specification for Low–Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.*

h. *A767/767M, Standard Specification for Zinc–Coated (Galvanized) Steel Bars for Concrete Reinforcement.*

i. *A775/A775M, Standard Specification for Epoxy–Coated Reinforcing Steel Bars.*

j. C31/C31 M, Standard Practice for making and Curing Concrete Test Specimens in the Field.

k. C33, Standard Specification for Concrete Aggregates.

l. C39/C39M, Standard Test Method or Compressive Strength of Cylindrical Concrete Specimens.

m. C42/C42M, Standard Test Method or Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

n. C78, Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third–Point Loading).

o. C88, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.

p. C94/C94M, Standard Specification for Ready–Mixed Concrete.

q. C109/C109M, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2–in. or [50–mm] Cube Specimens).

r. C143/C143M, Standard Test Method for Slump of Hydraulic Cement Concrete.

s. C150, Standard Specification for Portland Cement.

t. C157/C157M, Standard Test Method for Length Change of Hardened Hydraulic–Cement Mortar and Concrete.

u. C192/C192M, Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.

v. C230, Standard Specification for Flow Table for Use in Tests of Hydraulic Cement.

w. C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

x. C260, Standard Specification for Air–Entraining Admixtures for Concrete.

y. C309, Standard Specification for Liquid Membrane–Forming Compounds for Curing concrete.

z. C311, Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland–Cement Concrete.

aa. C332, Standard Specification for Lightweight Aggregates for Insulating Concrete.

bb. C348, Standard Test Method for Flexural Strength of Hydraulic Cement Mortars.

cc. C452, Standard Test Method for Potential Expansion of Portland-Cement Mortars Exposed to Sulfate.

dd. C457, Standard Test Method for Microscopical Determination of Parameters of the Air–Void System in Hardened Concrete.

ee. C469, Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression.

ff. C478, Standard Specifications for Precast Reinforced Concrete Manhole Sections.

gg. *C494/C494M,* Standard Specification for Chemical Admixtures for Concrete.

hh. C495, Standard Test Method for Compressive Strength of Lightweight Insulating Concrete.

ii. *C496/C496M,* Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.

jj. C513, Standard Test Method for Obtaining and Testing Specimens of Hardened Lightweight Insulating Concrete for Compressive Strength.

kk. C578, Standard Specification for Preformed, Cellular Polystyrene Thermal Insulation.

ll. C595, Standard Specification for Blended Hydraulic Cements.

mm. C596, Standard Test Method of Drying Shrinkage of Mortar Containing Hydraulic Cement.

nn. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

oo. C666/C666M, Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.

pp. C672, Standard Test Method for Scaling Resistance for Concrete Surfaces Exposed to Deicing Chemicals.

qq. C779, Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.

rr. *C881/C881M,* Standard Specification for Epoxy–Resin–Base Bonding Systems for Concrete.

ss. C882, Standard Test Method for Bond Strength of Epoxy–Resin Systems Used with Concrete by Slant Shear.

tt. C890, Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.

uu. C913, Standard Specifications for Precast Water and Wastewater Structures.

vv. C928, Standard Specification for Packaged, Dry, Rapid Hardening Cementitious Materials for Concrete Repairs.

ww. C939, Standard Test Method for Flow of Grout for Preplaced Aggregate Concrete (Flow Cone Method).

xx. C940, Standard Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced–Aggregate Concrete in the Laboratory.

yy. CI012, Standard Test Method for Length Change of Hydraulic Cement Mortars Exposed to a Sulfate Solution.

zz. C1042, Standard Test Method for Bond Strength of Latex Systems Used with Concrete by Slant Shear.

aaa. C1107, Standard Specification for Packaged Dry, Hydraulic–Cement Grout (Nonshrink).

bbb. C1116, Standard Specification for Fiber–Reinforced Concrete and Shotcrete.

ccc. C1202, Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetrations.

ddd. *C1218/C1218M*, Standard Test Method for Water–Soluble Chloride in Mortar and Concrete.

eee. C1240, Standard Specification for Silica Fume Used in Cementitious Mixtures.

fff. C1315, Standard Specification for liquid Membrane–Forming Compounds Having Special Properties for Curing and Sealing Concrete.

ggg. *C1602/C1602M–06*, Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.

hhh. D1056, Standard Specification for Flexible Cellular Materials Sponge or Expanded Rubber.

iii. D2000, Standard Classification System for Rubber Products in

Automotive Applications.

jjj. D4580, Standard Practice for Measuring Delaminations in Concrete Bridge Decks by sounding.

kkk. E119, Standard Test Methods for Fire Tests of Building Construction and Materials.

lll. E699, Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components.

mmm. E1155, Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers.

3. Precast/Prestressed Concrete Institute (PCI):

   a. MNL–117, Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.

   b. MNL–120, Design Handbook for Precast and Prestressed Concrete.

4. Corps of Engineers (COE)

   a. CRD–C611, Flow of Grout for Pre-placed Aggregate Concrete.

   b. CRD–C621, Specification for Non brink Grout.

5. Concrete Reinforcing Steel Institute (CRSI):

   a. Placing Reinforcing Bars.

   b. Manual of Standard Practice.

6. National Institute of Standards and Technology (NIST): Handbook 44, Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices.

7. National Ready Mixed Concrete Association (NRMCA).

8. NSF International (NSF): 61, Drinking Water System Components Health Effects.

9. Environmental Protection Agency (EPA), U.S. Code of Federal Regulations (CFR), Title 40: 52.254, Approval and Promulgation of Implementation Plans.

10. International Concrete Repair Institute (ICRI): 03730, Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion.

11. American Association of State Highway and Transportation Officials.

a. T277, Standard Method of Test for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.

12. International Conference of Building Officials (ICBO): ICBO Research Report.

13. Wire Reinforcement Institute (WRI): Manual of Standard Practice, Welded Wire Fabric.

PART 2 – PRODUCTS

Not used in this section.

PART 3 – EXECUTION

Not used in this section.

END OF SECTION

INDEX TO

SECTION 03 10 00– CONCRETE FORMWORK AND ACCESSORIES

SECTION 03 10 00

CONCRETE FORMWORK AND ACCESSORIES

PART 1 – GENERAL

1.01 PURPOSE

A. This Section is to provide the Contractor with the applicable information to support formwork and accessories for cast-in-place concrete.

1.02 SCOPE

A. This Section is for the design of concrete formwork,

1.03 DEFINITIONS, REFERENCE CODES, SPECIFICATIONS, AND STANDARDS

A. Refer to Section 03 00 00, Concrete Definitions and Reference Codes, Specifications, and Standards for information applicable to this Section.

1.04 DESIGN REQUIREMENTS

A. Design formwork in accordance with ACI 347 and ACI 318/318R to provide concrete finishes specified in Section 03 35 00.13, Concrete Finishes and Tolerances.

B. When high range water reducer (superplasticizer) is used in concrete mix, forms shall be designed for full hydrostatic pressure per ACI 347.

C. Make joints in forms watertight.

D. Limit panel deflection to 1/360th of each component span to achieve tolerances specified.

1.05 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:

a. Form Ties-Tapered Through-Bolts: Proposed method of sealing form tie hole; coordinate with details shown.

b. Manufacturer's data for form release agent.

2. Samples: One each as follows:

c. Form ties.

B. Information Submittals: Statement of qualification for formwork designer.

1.06 QUALIFICATIONS

A. Formwork Designer: Formwork, falsework, and shoring design shall be by an engineer licensed in the State of Georgia.

PART 2 – PRODUCTS

2.01 FORM MATERIALS

A. Wall Forms and Underside of Slabs and Beams:

1. Materials: Plywood, hard plastic finished plywood, overlaid waterproof particle board, or steel in "new and undamaged" condition, of sufficient strength and surface smoothness to produce specified finish.

B. Column Forms:

1. Rectangular Columns: As specified for walls.

C. Sandblasted Surface Forms: Medium density overlay plywood for flat concrete surfaces to be sandblasted.

D. Painted Surface Forms: High-density overlay plywood for flat concrete surfaces to be painted.

E. All Other Forms: Materials as specified for wall forms.

F. Form Release Agent:

1. Material: Release agent shall not bond with, stain, or adversely affect concrete surfaces, and shall not impair subsequent treatments of concrete surfaces when applied to forms. A ready-to-use water based material formulated to reduce or eliminate surface imperfections, containing no mineral oil or organic solvents. Environmentally safe, meeting local, state, and federal regulations.

2. Manufacturers and Products:

a. BASF, Shakopee, MN; MBT, Rheofinish 211.

b. Cresset Chemical Company; Crete-Lease 20-VOC.

c. Unitex Chemicals; Farm Fresh.

d. Atlas Construction Supply, Inc.; Bio-Guard.

G. Rustication Grooves and Beveled Edge Corner Strips: Nonabsorbent material, compatible with form surface, fully sealed on all sides prohibiting loss of paste or water between the two surfaces.

H. Form Ties:

1. Material: Steel.

2. Spreader Inserts:

a. Conical or spherical type.

b. Design to maintain positive contact with forming material.

c. Furnish units that will leave no metal closer than 1.5 inches to concrete surface when forms, inserts, and tie ends are removed.

3. Wire ties not permitted.

4. Flat bar ties for panel forms; furnish Plastic or rubber inserts with minimum 1.5-inch depth and sufficient dimensions to permit patching of tie hole.

5. Water Stop Ties: For hydraulic structures, basements, pipe galleries, and accessible spaces below finish grade, furnish one of the following:

a. Integral steel water stop 0.103 inch thick and 0.625 inch in diameter tightly and continuously welded to tie.

b. Neoprene water stop 3/16 inch thick and 15/16 inch diameter whose center hole is one half diameter of tie, or molded plastic water stop of comparable size.

c. Orient water stop perpendicular to tie and symmetrical about center of tie.

d. Design ties to prevent rotation or disturbance of center portion of tie during removal of ends and to prevent water leaking along tie.

6. Through-Bolts: Tapered minimum 1-inch diameter at smallest end.

7. Elastic Vinyl Plug:

a. Design and size of plug to allow insertion with tool to enable plug to elongate and return to Original length, and diameter upon removal forming watertight seal.

b. Manufacturer and Product: Dayton/Richmond Co., Miamisburg, OH; A58 Sure Plug.

PART 3 – EXECUTION

3.01 PROCEDURE

A. Form Surface Preparation:

1. Thoroughly clean form surfaces that will be in contact with concrete or that have been in contact with previously fast concrete, dirt, and other surface contaminants prior to coating surface.

2. Exposed Wood Forms in Contact with Concrete: Apply form release agent as recommended by the manufacturer.

3. Steel Forms: Apply form release agent to steel forms as soon as they are cleaned to prevent discoloration of concrete from rust.

B. Erection:

1. General: Unless specified otherwise, follow applicable recommendations of ACI 347.

2. Beveled Edges (Chamfer):

   a. Form 3/4-inch bevels at concrete edges, unless otherwise shown.

   b. Where beveled edges on existing adjacent structures are other than 3/4 inch, obtain Engineer's approval of size prior to placement of beveled edge.

3. Wall Forms:

   a. Do not reuse forms with damaged surfaces.

   b. Locate form ties and joints in an uninterrupted uniform pattern.

   c. Inspect form surfaces prior to installation to assure conformance with specified tolerances.

4. Forms for Curbs, Sidewalks, and Driveways:

   a. Provide standard steel or wood forms.

   b. Set forms to true lines and grades, and securely stake in position.

5. Form Tolerances: Provide forms in accordance with Section 03 35 00.13, Concrete Finishes and Tolerances.

C. Formwork Removal:

1. When formed surfaces require finishing, remove forms as soon as removal operations will not damage concrete.

2. Nonsupporting forms (sides of beams, walls, columns, and similar parts of Work) may be removed after cumulatively curing at not less than 50 degrees F for 24 hours from time of concrete placement if:

   a. Concrete is sufficiently hard so as not to sustain damage by form removal operations.

   b. Curing and protection operations are maintained.

3. Elevated Structural Slabs or Beams: In accordance with ACI 318/318R, Chapter 6, and at such time as concrete has reached compressive strength equal to 80 percent of specified 28-day compressive strength as determined by test cylinders.

END OF SECTION

INDEX TO

SECTION 03 21 00 – REINFORCING STEEL

SECTION 03 21 00

REINFORCING STEEL

PART 1 – GENERAL

1.01 PURPOSE

A. The purpose of this Section is to provide the Contractor with applicable information for use of concrete reinforcing steel.

1.02 SCOPE

A. This Section is for selection of mild steel reinforcing.

1.02 DEFINITIONS, REFERENCE CODES, SPECIFICATIONS, AND STANDARDS

A. Refer to Section 03 00 00, Concrete Definitions and Reference Codes, Specifications, and Standards for information applicable to this Section.

1.04 SUBMITTALS

A. Action Submittals:

1. Shop Drawings prepared in accordance with CRSI Manual of Standard Practice and ACI SP–66 Detailing Manual:
    a. Bending lists.
    b. Placing drawings.
2. Welded, metallic sleeve splice, and mechanical threaded connection.

B. Informational Submittals:

1. Lab test reports for reinforcing steel showing stress–strain curves and ultimate strengths.
2. Mechanical Splices:
    a. Current International Conference of Building Officials (ICBO) Research Report or equivalent code agency report listing findings to include acceptance, special inspection requirements, and restrictions.
    b. Manufacturer's instructions.
    c. Verification that device threads have been tested and meet requirements for thread quality, in accordance with manufacturers published methods.
3. Welding Qualification: Prior to welding, submit welder qualifications and

nondestructive testing procedures in accordance with Section 05 05 23, Welding.

4. Test results of field testing.

1.05 QUALITY ASSURANCE

A. Welder Qualifications: Certified in accordance with AWS DI.4.

PART 2 – PRODUCTS

SEE ATTACHMENT A

PART 3 – EXECUTION

3.01 PREPARATION

A. Notify Contractor when reinforcing is ready for inspection and allow sufficient time for inspection prior to placing concrete.

B. Coat wire projecting from precast concrete bar supports with dielectric material, epoxy, or plastic.

3.02 REINFORCING BAR INSTALLATION

A. Conform to requirements of ACI 301 and ACI 318.

B. Splicing:

1. Use lap splices, unless otherwise shown or permitted in writing by Engineer.

2. Welded Splices: Accomplish by full penetration groove welds and develop a minimum of 125 percent of yield strength of bar.

C. Mechanical Splices and Connections:

1. Use only in areas specifically approved in writing by Engineer.

2. Install threaded rods as recommended by manufacturer with threads totally engaged into coupling sleeve and in accordance with ICBO Research Report.

3. For metal sleeve splice, follow manufacturer's installation recommendations.

4. Maintain minimum edge distance and concrete cover.

D. Tying Reinforcing Bars:

1. Tie every other intersection on mats made up of Nos. 3, 4, 5, and 6 bars to hold them firmly at required spacing.

2. Bend tie wire away from concrete surface to provide clearance of 1 inch from surface of concrete to tie wire.

E. Reinforcement around Openings: On each side and above and below pipe or opening, place an equivalent area of steel bars to replace steel bars cut for opening. Extend steel reinforcing a standard lap length beyond opening at each end.

F. Welding Reinforcement: Do not perform welding until welder qualifications are approved.

G. Straightening and Rebending: Field bending of reinforcing steel bars is not permitted.

H. Unless permitted by Contractor, do not cut reinforcing bars in field.

3.04 WELDED WIRE FABRIC INSTALLATION

A. Lap splices at least 1–1/2 courses of fabric or minimum 8 inches.

B. Tie laps and splices securely at ends and at least every 24 inches with tie wire.

C. Place welded wire fabric on concrete blocks and rigidly support equal to that provided for reinforced bars. Do not use broken concrete, brick, or stone.

D. Follow ACI *318/318R* and current Manual of Standard Practice, Welded Wire Fabric.

E. Do not use fabric that has been rolled. Install flat sheets only.

END OF SECTION

ATTACHMENT A
CONCRETE REINFORCING

2.01 MATERIALS

☒ Mild Reinforcing Steel	• ASTM A615M, Grade 60. • Includes stirrups, ties, and spirals.
☒ Welded Reinforcing Steel	• ASTM A706/A706M, Grade 60. • Welder Qualifications: Certified in accordance with AWS D1.4. • Includes stirrups, ties, and spirals. • Submit test results of field welding.
☒ Metal Sleeve Splice	• Furnish with cast filler metal, capable of developing, in tension or compression, 125 percent of minimum tensile strength of bar.
☒ Mechanical Threaded Connections	• Furnish metal coupling sleeve with internal threads engaging threaded ends of bars developing in tension or compression 125 percent of yield strength of bar.
☒ Welded Wire Fabric	• ASTM A185 or ASTM A497 and ACI 318/3218R, using ASTM A82 wire of 75 ksi minimum tensile strength.
☒ Tie Wire	• Black, soft-annealed 16 gauge wire. • Nylon-, epoxy-, or plastic-coated wire.

2.02 ACCESSORIES

A. Bar Supports and Spacers:

1. Use precast bar supports or all-plastic bar supports and side form spacers, unless noted otherwise. Do not use other types of supports or spacers.

2. Bar supports shall have sufficient strength and stiffness to carry loads without failure, displacement, or significant deformation. Space bar supports so minimum concrete cover is maintained for reinforcing between supports.

3. Where concrete surfaces are exposed to weather, earth, water, chloride intrusion, or corrosive chemicals, bar supports and spacers shall be precast concrete and have geometry and bond characteristics that deter movement of moisture from the surface to the reinforcement.

4. Precast concrete supports shall have same minimum strength and shall be made from same materials as that of the concrete in which they are to be embedded. Precast concrete supports shall be cast and properly cured for at least 7 days before use and shall have a wire or other device cast into each block for the purpose of attaching them securely to the reinforcing steel.

5. In Beams, Columns, Walls, and Slabs of Exposed Concrete: Use small precast concrete blocks made of same color as concrete in which they are embedded.

6. Design and fabricate special bar supports for top reinforcing bars in slabs where standard bar supports do not possess necessary geometry, strength, or stiffness.

END OF ATTACHMENT

ATTACHMENT A

CONCRETE REINFORCING

2.01 MATERIALS

Mild Reinforcing Steel:	• ASTM A615/A615M, Grade 60 • Includes stirrups, ties, and spirals
Welded Reinforcing Steel:	• ASTM A 706/A 706M, Grade 60 Steel • Welder Qualifications: Certified in accordance with AWS D1.4. • Includes stirrups, ties, and spirals • Submit test results of field welding
Metal Sleeve Splice:	• Furnish with cast filler metal, capable of developing, in tension or compression, 125 percent of minimum tensile strength of bar.
Mechanical Threaded:	• Furnish metal coupling sleeve with internal Connections threads engaging threaded ends of bars developing in tension or compression 125 percent of yield strength of bar.
Welded Wire Fabric:	• ASTM A 185 or ASTM A497 and ACI *318/318R*, using ASTM A82 wire of 75 ksi minimum tensile strength
Tie Wire	• Black, soft–annealed 16–gauge wire. • Nylon–, epoxy–, or plastic–coated wire.

2.02 ACCESSORIES

A. Bar Supports and Spacers:

1. Use precast concrete bar supports or all–plastic bar supports and side form spacers, unless noted otherwise. Do not use other types of supports or spacers.
2. Bar supports shall have sufficient strength and stiffness to carry loads without failure, displacement, or significant deformation. Space bar supports so minimum concrete cover is maintained for reinforcing between supports.
3. Where concrete surfaces are exposed to weather, earth, water, chloride intrusion, or corrosive chemicals, bar supports and spacers shall be precast concrete and have geometry and bond characteristics that deter movement of moisture from the surface to the reinforcement.
4. Precast concrete supports shall have same minimum strength and shall be made from same materials as that of the concrete in which they are to be embedded. Precast concrete supports shall be cast and properly cured for at least 7 days before use and shall have a wire or other device cast into each block for the purpose of attaching them securely to the reinforcing steel.
5. In Beams, Columns, Walls, and Slabs of Exposed Concrete: Use small precast concrete blocks made of same color as concrete in which they are embedded.
6. Design and fabricate special bar supports for top reinforcing bars in slabs where standard bar supports do not possess necessary geometry, strength, or stiffness.

END OF ATTACHMENT

INDEX TO

SECTION 03 30 00 – CAST-IN-PLACE CONCRETE

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Cast-in-place concrete for basin slab, walls, beams, slab on grade of building, equipment slabs, dumpster pad, wash pad, and stair slabs.

B. Formwork, form accessories, and bracing.

C. Reinforcement.

D. Joint Materials.

E. Waterstops.

1.2 RELATED SECTIONS

A. Section 02 30 00 – Subsurface Investigation

B. Section 31 00 00 – Earthwork

C. Section 31 23 13 – Subgrade Preparation

1.3 REFERENCES (LATEST REVISION)

A. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice.

B. CRSI Placing Reinforcing Bars

C. AASHTO M 182 – Burlap Cloth Made from Jute or Kenaf

D. ACI 211.1 – Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

E. ACI 301 – Specifications for Structural Concrete.

F. ACI 302.1R – Guide for Concrete Floor and Slab Construction.

G. ACI 304R – Guide for Measuring, Mixing, Transporting and Placing Concrete.

H. ACI 305R – Hot Weather Concreting.

I. ACI 306R – Cold Weather Concreting.

J. ACI 308R – Guide to Curing Concrete.

K. ACI 318 – Building Code Requirements for Structural Concrete.

L. ACI 347 – Guide to Formwork for Concrete.

M. ACI 350 – Code Requirements for Environmental Engineering Concrete Structures and Commentary

N. ACI 350.1 – Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures and Commentary

O. ASTM A185 – Steel Welded Wire Reinforcement, Plain, for Concrete

P. ASTM A615 – Deformed and Plain Carbon – Steel Bars for Concrete Reinforcement.

Q. ASTM C 31 - Making and Curing Concrete Test Specimens in the Field

R. ASTM C 33 – Concrete Aggregates.

S. ASTM C 39 – Compressive Strength of Cylindrical Concrete Specimens.

T. ASTM C 42 – Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

U. ASTM C 94 – Ready-Mixed Concrete.

V. ASTM C 143 - Slump of Hydraulic Cement Concrete

W. ASTM C 150 – Portland Cement.

X. ASTM C 171 - Sheet Materials for Curing Concrete

Y. ASTM C 172 – Practice for Sampling Freshly Mixed Concrete.

Z. ASTM C 231 – Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

AA. ASTM C 260 – Air-Entraining Admixtures for Concrete.

BB. ASTM C 309 – Liquid Membrane-Forming Compounds for Curing Concrete.

CC. ASTM C 494 – Chemical Admixtures for Concrete.

DD. ASTM C 618 – Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

EE. ASTM C 920 – Standard Specification for Elastomeric Joint Sealants

FF. ASTM C 989 – Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars

GG. ASTM C 1107 - Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

HH. ASTM D 1751 – Preformed Expansion Joint Filler for Concrete paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

II. ASTM D 2103 – Polyethylene Film and Sheeting

JJ. ASTM D 3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

KK. ASTM E 329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

LL. ASTM E 1155 - Determining Floor Flatness and Floor Levelness Numbers

1.4 MEASUREMENT AND PAYMENT

Under this contract concrete items will be covered in the Contractor's bid as a lump sum amount. The cost for concrete items will include all materials, accessories, testing and labor required to satisfy the requirements of this specification and the designs provided on the construction drawings.

1.5 SUBMITTALS FOR REVIEW

The Engineer of Record will review the submittals identified herein.

A. Product Data: Provide data for proprietary materials and items, including reinforcements, admixtures, forming accessories, curing compounds and others if requested by Engineer.

B. Mix designs and test results as specified hereinafter.

C. Shop Drawings: Submit shop drawings for fabrication, bending and placement of reinforcing steel to Engineer for review. Comply with ACI 315 "Manual of Standard Practice for Detailing Concrete Reinforced Structures". Indicate sizes, spacing, and locations of reinforcing steel, supporting and spacing devices, bar bending details, and bar lists.

D. Water Test Program, further detailed herein.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301, 318 and 350, as applicable. ACI 350 requirements shall be applied to the Basins (water containing structures) and Chlorine Contact Basin, and Primary Influent Screen slab.

B. Maintain at least one copy of ACI 301 document on site at all times.

C. Acquire cement and aggregate from same source for all work.

D. Conform to ACI 305R when concreting during hot weather.

E. Conform to ACI 306R when concreting during cold weather.

F. Conform to ACI 117 –Specifications for Tolerances for Concrete Construction and Materials.

G. Engineer reserves the right to mark and reject portions of concrete not within tolerance as specified.

H. Concrete Mix Design: Employ a testing laboratory acceptable to the Engineer to perform material evaluating tests and to design concrete mixes. Concrete mix design shall be at Contractor's expense. Submit mix designs to Engineer at least 25 days prior to start of work.

I. Materials and installed work may require testing and retesting at any time during process of work, and shall be done at Contractor's expense.

J. Contractor Quality Control personnel assigned to concrete construction shall be American Concrete Institute (ACI) Certified Workmen in one of the following grades (as applicable) or shall have written evidence of having completed similar qualification programs:

1. Concrete Field Testing Technician, Grade I
2. Concrete Laboratory Testing Technician, Grade I or II
3. Concrete Construction Inspector, Level II
4. Concrete Transportation Construction Inspector or
5. Reinforced Concrete Special Inspector, jointly certified by American Concrete Institute (ACI) and International Code Council (ICC) and licensed by Georgia Department of Labor, Licensing and Regulations (GALLR).

The foreman or lead journeyman of the flatwork finishing crew shall have similar qualification for ACI Concrete Flatwork Technician/Finisher or equal, with written documentation

1.7 TESTS

A. All sampling and testing services shall be performed by a testing agency which operates in accordance to ASTM D 3740 and E 329 latest revision and acceptable to the Engineer, as part of the special inspections, at Owner's expense. Contractor shall conduct all coordination and scheduling with testing and inspection agency. Owner shall not pay for testing agency services if, due to Contractor's schedule mishaps or lack of preparedness, testing and inspecting services are scheduled and not required.

B. Contractor shall submit to the Engineer, concrete materials and concrete mix designs of concrete proposed for use. This submittal shall include results of all testing performed to qualify materials and establish mix designs. All mix designs shall be proportioned in accordance with Section 3.9 of ACI 301, Method 1 (trial batches) or Method 2 (field experience). The average strength used as basis for selecting proportions shall be as specified in Paragraph 3.9.2 of ACI 301.

C. Testing laboratory shall conduct strength tests of the concrete during construction in accordance with Section 16.3.4 of ACI 301. At least one strength test (6 test cylinders) shall be made for each 50 cubic yards or fraction thereof, of each mix design placed each day.

D. Slump tests shall be conducted regularly during construction in accordance with Section 16.3.5 of ACI 301.

E. Air content of the concrete sample for each strength test shall be determined in accordance with Section 16.3.6 of ACI 301.

F. Density (unit weight) of concrete shall be determined for each sample, in accordance with ASTM C138.

G. Results of all tests shall be submitted to Engineer within three days of testing, with copies to Contractor. Test reports shall include the exact location in the work at which batch represented by a test was deposited.

H. Evaluation of test results and acceptance of concrete shall be in accordance with Chapter 17 of ACI 301.

I. Floor flatness and levelness shall be as specified herein. All floor tolerance measurements shall be made within 48 hours of slab installation and shall precede the removal of forms. The results of all floor profile tests shall be provided to the Engineer within 72 hours after each slab installation.

J. Water Tightness Test shall be conducted in accordance with ACI 350.1 and as specified herein.

1.8 ACCEPTANCE OF COMPLETED WORK:

A. Acceptance or rejection of completed concrete work shall be in accordance with Chapter 18 of ACI 301.

PART 2 – PRODUCTS

2.1 FORM MATERIALS

A. Shall conform to ACI 301.

B. All form materials shall be selected to provide desired finish, prevent any deflection at any point in time and spalling during form removal.

C. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on Drawings.

D. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material.

E. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with or adversely affect concrete surfaces.

F. Form Ties: factory fabricated, adjustable length, removable or snap-off type, galvanized metal form ties with cones. Ties shall be free of defects and shall not

leave holes larger than 1-inch in concrete surface upon removal. Provide units that will leave metal no closer than 1½ inches to surface.

G. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

H. Chamfered Corners: Chamfered strip type; ¾"x¾" typically; maximum possible lengths.

I. Dovetail Anchor Slot: Galvanized steel, 22 gage thick, foam filled slots, nail holes for securing to concrete formwork; Heckman Building Products No. 100 or as approved.

J. Flashing Reglets: Galvanized steel, 26 gage thick, longest possible lengths, with alignment splines for joints, tape sealed slots, anchors for securing to concrete formwork, sloped strip-out, Heckman Building Products No. 230 or as approved.

2.2 REINFORCING MATERIALS

A. Reinforcing Steel: ASTM A 615, Grade 60 billet steel deformed bars; uncoated finish.

B. Supports for Reinforcement: Bolsters, chairs, spacers and other devices for spacing, supporting, and fastening reinforcing bars in place. Use wire bar type supports complying with CRSI specifications.

1. For concrete cast on grade, use supports with sand plates or horizontal runners where base material will not support chair legs or 6,000 psi solid concrete blocks meeting CRSI requirements.
2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

2.3 CONCRETE MATERIALS

A. Cement: ASTM C 150, Type I – Normal. Use one (1) brand of cement throughout the project.

B. Fine and Coarse Aggregates: ASTM C 33. Coarse aggregate shall be No. 57 (up to 1"). Provide aggregate from a single source. All aggregate shall be washed, free from dirt and debris and shall be uniformly graded.

C. Water: Clean, fresh and not detrimental to concrete, ASTM C 94.

D. Fly Ash: ASTM C 618 Type F. Loss of ignition shall not exceed 3%. Amount of fly ash not to exceed 25% by weight of total cementitious material.

E. Ground Granulated Blast Furnace Slag: ASTM C 989. Amount of slag not to exceed 45% by weight of total cementitious material.

2.4 ADMIXTURES

A. Air Entrainment: ASTM C 260. Certified by manufacturer to be compatible with other required admixtures. Use air-entraining admixture in concrete for all structural concrete exposed to the weather. Do not use for interior building slabs. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content of that specified in concrete mix requirements stated below.

B. Chemical: ASTM C 494. Types A-G, containing not more than 0.1 percent chloride ions. A high range water reducer (HRWR) is required for all concrete in walls and for other concrete which is pumped. It is optional for other concrete which is not pumped.

C. Pozzolanic Admixtures: ASTM C 618.

D. Calcium chloride or admixtures containing more than 0.1% chloride ions are not permitted.

E. Certification: Written certification of conformance to above-mentioned requirements and the chloride ion content will be required from admixture manufacturer prior to mix design review by Engineer.

2.5 ACCESSORIES

A. Bonding Compound: Polyvinyl acetate, rewettable type; by the Sika Corporation or equivalent.

B. Epoxy Adhesive: Two component, 100% solids, 100% reactive compound suitable for use on dry or damp surfaces; Sikadur by Sika Corporation or equivalent.

C. Non-Shrink Grout: ASTM C 1107, Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 6,000 psi in 28 days.

D. Concrete Repair Grout: For the repair of defective areas of concrete.

1. For vertical and overhead surfaces, use one (1) of the following (or approved equal):
   a. "Five Star Structural Concrete V/O"; Five Star Products, Inc.
   b. "Euco Verticoat"; Euclid Chemical Co.
   c. "Sikatop 122"; Sika Corp.

2. For horizontal surfaces, use one (1) of the following (or approved equal):
   a. "Five Star Structural Concrete"; Five Star Products, Inc.
   b. "Concrete Coat"; Euclid Chemical Co.
   c. "Sikatop 122"; Sika Corp.

E. Concrete Slab on Grade Crack Repair: Cracks up to ¼" wide are to be filled with Spal-Pro 2000 by Metzger/McGuire or approved equal.

F. Structural Slab & Wall Crack Repair: Cracks up to 1/8" wide are to be filled with Prime Flex 900 XLV by Prime Resins or approved equal.

G. Joint Filler (to be applied at joints between vertical edges where noted on drawings): Preformed, Nonextruding, Resilient, Bituminous; ½"-1" joint width; ASTM D1751. Size of filler shall be determined in accordance with typical joint detail provided on Structural Drawings.

H. Joint Sealant (to be applied at joints between vertical edges where noted on drawings): Elastomeric sealant, ASTM C920, single component (Type S), pourable or non-sag grade (Grade P or NS), class 50 or 100/50, use T; ½"-1" joint width.

I. Waterstops: All waterstops shall be PVC Flat Ribbed profile, fabricated and installed per manufacturer's recommendations. Waterstops shall be provided at all joints in the water containing basins unless noted otherwise. Waterstops are not required at joints occurring above elevation 26.0.

1. All waterstops shall be 6" wide by 3/8" thick Greenstreak style number 679 or equal, except where noted otherwise.

2. Where 4" waterstop is required, a 4" wide by 3/16" thick Greenstreak style number 781 or equal shall be used.

J. Vapor Barrier: 10 mil polyethylene sheeting shall be provided underneath the concrete slab on grade of the building. Vapor barrier shall be in accordance with ASTM D 2103.

2.6 CURING MATERIALS

A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.

B. Moisture-Retaining Cover: One of the following, complying with ASTM C 171:

1. Waterproof paper
2. Polyethylene film
3. Polyethylene-coated burlap

C. Membrane Curing Compound: ASTM C 309, clear with fugitive dye, 30% solids.

2.7 CONCRETE MIX DESIGN

The following shall apply to all concrete shown on the structural drawings:

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch (with 3 point curve) or field experience methods as specified in ACI 301. If trial batch method is used, use an independent testing facility acceptable to Engineer for preparing and reporting proposed mix designs.

B. Submit written reports to Structural Engineer of proposed mix for concrete at least 25 days prior to start of work. Do not begin concrete production until mixes have been approved by Engineer.

C. Concrete shall be batched, mixed and transported from a supplier with sufficient facilities to deliver concrete at the rate required and in accordance with ASTM C 94. Ready-mix concrete supplier shall furnish Engineer a certified statement the concrete furnished conforms to provisions of these specifications.

D. Compressive Strength: Minimum 4,000 psi in 28 days.

E. Water/cement ratio (maximum): 0.5 by weight.

F. Slump: 4 to 5 inches maximum, measured at the point of discharge, before the addition of any high range water reducer (HRWR). If HRWR is added at the concrete plant, then slump may be measured at the job site after the HRWR has been added.

G. Air Entrainment: 3.5% ± 1%.

H. Fly Ash Content: 15-25% of total cementitious material

I. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, at no additional cost to Owner and as accepted by Engineer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Engineer before using in work.

2.8 CONCRETE MIXING

A. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as herein specified.

B. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required.

1. When air temperature is between 85 degrees F (30 degrees C) and 90 degrees F (32 degrees C), reduce mixing and delivery time from 90 minutes to 75 minutes, and when air temperature is above 90 degrees F (32 degrees C), reduce mixing and delivery time to 60 minutes. Concrete shall not be placed when the air temperature exceeds 95 degrees.

PART 3 – EXECUTION

3.1 ON SITE OBSERVATIONS OF WORK

A. Coordination: Coordinate the installation of joint materials with placement of forms and reinforcing steel. Coordinate opening sizes and locations, as well as reinforcing around the openings, with the architectural, mechanical, electrical and plumbing drawings.

B. Engineer or Project Representative will have the right to require any portion of work be completed in their presence and if work is covered up after such instruction, it shall be exposed by Contractor for observation. However, if

Contractor notifies Engineer such work is scheduled, and the Engineer fails to appear within 48 hours, Contractor may proceed.

C. All work completed and materials furnished shall be subject to review by the Engineer or Project Representative. Improper work shall be reconstructed. All materials, which do not conform to requirements of specifications, shall be removed from work upon notice being received from the Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

D. Contractor shall give the Project Engineer or Project Representative and Special Inspector a minimum of 48 hours notice for all required observations or tests.

E. Special Inspector shall inspect forms and reinforcing within 24 hours prior to concrete pours. Engineer shall have the option to inspect forms and reinforcing within 24 hours prior to concrete pours. It is Contractor's responsibility to notify Special Inspector Engineer as required herein.

3.2 FORMWORK PREPARATION AND ERECTION

A. Design of formwork is Contractor's responsibility. Erect formwork, shoring, and bracing to support vertical, lateral, static and dynamic loads until such loads can be supported by concrete structure in accordance with requirements of ACI 301. Maintain formwork construction tolerances complying with ACI 347.

B. Forms shall conform to shapes, lines, elevations, locations and dimensions of members as called for on the plans. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes.

C. Design formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.

D. Earth forms shall not be permitted for the installation of structural concrete.

E. Contractor shall coordinate the work of other sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

F. Before placing of either reinforcing steel, embedded items, or concrete, surfaces of forms shall be thoroughly cleaned and covered with an accepted coating material which will effectively prevent absorption of moisture and prevent bond with the concrete. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

G. Clean re-used forms of concrete matrix residue, repair and patch as required to return forms to acceptable surface condition.

H. Chamfer all exposed corners and edges ¾" unless noted otherwise, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

I. Fabricate forms for easy removal without hammering or prying against concrete surfaces.

J. During cold weather remove ice and snow from within the forms. Do not use de-icing salts. Do not use water to clean out forms unless formwork and concrete construction proceed within heated enclosed areas.

3.3 FORM REMOVAL

A. Forms shall be removed carefully to avoid damage to green concrete. Ties shall be cut back 1 inch from the surface and all holes, stone pockets, voids, and minor defects shall be patched immediately upon removal of forms.

B. Forms shall not be removed within 7 days of pouring concrete, unless 70% of compressive strength has been achieved AND Engineer has approved removal.

C. Contractor shall keep live loads off the concrete until it has sufficient strength to support applied loads.

B. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

C. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

D. Store removed forms so surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

3.4 REINFORCEMENT

A. All reinforcement shall be free of rust, mill scale, ice, mud, oil or other materials which may adversely affect or reduce the bond.

B. Reinforcement shall be placed, supported, and secured against displacement by construction loads or the placing of concrete. Bar supports and spacers shall be made of concrete, metal, plastic, or other accepted material and subject to review by the Engineer. Where concrete surfaces will be exposed to weather in the finished structure, portions of all accessories within 1/2 inch of surface shall be noncorrosive or protected against corrosion.

C. Reinforcement shall be placed in accordance with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars". Minimum concrete cover for reinforcement shall be as required in ACI 318 and 350, as applicable.

D. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement and operations. Set wire tires so ends are

directed in to concrete, not toward exposed concrete surfaces. As a minimum, tie alternate bar intersections.

E. Field bending of bars partially imbedded in concrete will not be permitted.

F. Locate reinforcing splices not indicated on the drawings at points of minimum stress.

G. Accommodate placement of formed openings. Provide additional reinforcing as required.

3.5 PREPARATION FOR PLACING

A. Water shall be removed from excavations before concrete is deposited. Hardened concrete debris and other foreign materials shall be removed from the interior of forms and inside of mixing and conveying equipment.

B. Care shall be taken in the placement of the vapor barrier. Sheeting shall not be punctured or otherwise damaged in such a way that compromises the functionality of the vapor barrier.

C. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

D. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

E. Templates shall be used for the proper installation of anchor bolts. Templates and anchor bolts shall be in position prior to placing the concrete.

F. Waterstop shall be placed where shown on the construction drawings and specified herein, in accordance with instructions and products supplied by the manufacturer. Placement within the form and amount of concrete coverage shall be as required by manufacturer. Waterstop shall be held in place by acceptable measures so there will be no lateral movement or bending of the material during placement of concrete.

G. Construction Joints: Locate construction joints so as not to impair strength and appearance of the structure, as acceptable to Engineer. Where specified, provide construction joint layout plans for Engineers' approval.

H. Continue reinforcement across construction joints.

I. Isolation/Expansion Joints: Construct isolation joints between structural concrete and site concrete & pavement, as indicated on the plans. Materials for isolation/expansion joints are to be as specified previously in this specification.

3.6 PLACING CONCRETE

A. Place concrete in accordance with ACI 301, 304, 318, and 350, as applicable.

B. Pre-placement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Notify Engineer minimum 48 hours prior to commencement of placement.

C. Moisten wood forms immediately before placing concrete where form coatings are not used.

D. Concrete shall be placed only upon surfaces free from frost, ice, mud, standing water and other detrimental substances or conditions.

E. Concrete shall be handled and deposited using equipment and methods which will prevent segregation or loss of ingredients. Equipment and methods for placing concrete shall be subject to review by the Engineer.

F. Water shall not be added at the site without permission from the Engineer.

G. Concrete having attained its initial set or having contained water for more than 90 minutes shall not be used in the work.

H. Sufficient mixing and placing capacity shall be provided so concrete which is being integrated with fresh concrete is still plastic. Concrete shall be deposited continuously or in layers of such thickness so no concrete will be deposited on concrete which has hardened sufficiently to cause formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be placed subject to acceptance by the Engineer.

I. Concrete shall not be allowed or caused to flow horizontally or on slopes in the forms. Concrete placing on a slope shall begin at lower end of the slope and progress upward.

J. Consolidate by mechanical vibration so concrete is thoroughly worked around the reinforcement, around embedded items and into corners of forms and around piling. Use of vibrators to transport concrete within forms shall not be allowed. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

K. A spare vibrator shall be kept on the job site during all concrete placing operations.

L. When temperature of the surrounding air is expected to be below 40 degrees F during placing or 24 hours thereafter, temperature of concrete as placed, shall be no lower than 55 degrees for sections less than 12 inches in any dimension nor 50 degrees for any other sections. The temperature of the concrete as placed shall not be so high as to cause difficulty from loss of slump, flash set or cold joints and shall not exceed 95 degrees F.

M. Ensure reinforcement, inserts, embedded parts, and shear studs are not disturbed during concrete placement.

N. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

O. Place Concrete continuously in designated section. Do not interrupt successive placement or permit cold joints to occur.

P. Separate slabs on grade from vertical surfaces with joint filler, as specified on the construction drawings.

Q. Place joint filler securely to resist movement by wet concrete. Set top to required elevation to accommodate joint sealant.

R. Saw cut control joints (where indicated and as specified on drawings) within 8 hours of hardening.

3.7 CONCRETE FINISHING

A. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or derbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

B. Interior Floor Flatness Tolerance for Building Slab on Grade: A nonslip conventional flatness requirement of F_F/F_L = 15/15, SWI = 5mm, is applicable to interior slab surfaces. Testing shall be accordance with ASTM E 1155.

C. Formed surfaces of concrete shall be given finishes specified below unless the contract documents specify otherwise.

1. Rough Form Finish – For all concrete surfaces not exposed to public view. No selected form facing materials shall be specified for rough form finish surfaces. Tie holes and defects shall be patched. Fins exceeding 1/4 inch in height shall be chipped or rubbed off. Otherwise, surfaces shall be left with texture imparted by the forms.

2. Rubbed Form Finish: For sides of formed concrete surfaces exposed-to-view. This includes walls, slabs, & beams extending to one (1) foot below grade. Use smooth, high quality forms. Chip away all high spots. Within 72 hours after forms are removed, fill all air bubbles and small holes with a sand-cement-bonding agent grout proportional to match the surrounding finish. Rub the entire surface of with a fine abrasive stone to create a smooth surface, free of all form marks and holes. Do <u>not</u> finish by leaving a thin "plastered" layer of grout. For repair of defective areas with holes deeper than 1/2", refer to concrete repair products listed in section 2 of this specification.

3. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces.

Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

4. Float Finish: Provide a float finish to 2nd level floor slabs except where noted otherwise herein. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane as required to obtain floor flatness and levelness. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

5. Medium Broom (Non-Slip) Finish: After floating, provide a non-slip broom finish to exterior intermediate stair landing, stair treads and exterior structural concrete pads, unless noted otherwise.

6. Trowel Finish: Provide a trowel finish to equipment building and centrifuge building interior slabs on grade. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance. Grind smooth surface defects which would telegraph through applied floor covering system.

7. Burnished Finish: Provide a burnished finish (or similar) on the floors of the electrical/MCC, mechanical and server rooms. Typically, this finish is achieved by repeatedly troweling the concrete floor until it has a mirror-like appearance. Finished result shall have a glossy appearance.

8. Where surfaces are to receive a specialty paint, coating or finish product, the method of finishing the concrete surface shall be coordinated and confirmed by the manufacturer of the paint, coating or finishing products. The following areas must be coordinated:

    a. Equipment Building slab on grade and the bottom 6 inches of the interior face of the walls of the equipment support room, equipment room and chemical room (ground floor) shall receive a corrosion and abrasion resistant coating of Stonchem, identified in the Paintings and Coatings Specification.

    b. The Equipment Building 2nd floor exterior slab, including the landing at the top of the stairs, the control room, store room and bathroom floors shall receive a decorative, chemical and abrasion resistant coating of Stontec UTF, identified in the Paintings and Coatings Specification.

    c. The interior walls and base slab of the basins and underside of all concrete walkways over the basins shall receive waterproof or anti-corrosion coating systems, as detailed in the Paintings and Coatings Specification.

3.8 CONCRETE CURING

A. Curing shall be provided by either a moisture cure or membrane cure, in accordance with the requirements listed herein.

B. Unformed Surfaces shall be moisture cured for a minimum of 7 days. Following initial period, the use of membrane curing compounds may be used for subsequent curing.

C. Horizontal Formed Surfaces shall be moisture cured for a minimum of 7 days. Following initial period, the use of membrane curing compounds may be used for subsequent curing.

D. Vertical Formed Surfaces shall be either moisture cured for a minimum of 7 days or cured via membrane curing compound.

E. Non-Structural Concrete: Sidewalks, curbs & maintenance pads may be cured with a membrane curing compound in addition to any of the moisture curing methods listed herein. During hot weather concreting, if a curing compound is used, the non-structural slabs shall still be moist cured for 12 hours immediately following initial set.

F. For **moisture cure**: Immediately after placement and finishing, provide moisture curing by one (1) of the methods below. Forms shall be left in place for a minimum of 7 days during moisture curing.

1. Keep concrete surface continuously wet by covering with water.

2. Continuous water-fog spray.

3. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.

4. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

   Hot Weather Curing: During hot weather concreting keep forms moist and covered with plastic during the initial 7-day curing period. Hot weather curing shall be in accordance with ACI 305

G. For **membrane cure**: Immediately after placement and finishing, concrete shall be protected from moisture loss for not less than 7 days. For surfaces not in contact with forms, curing compound shall be uniformly applied after water sheen disappears from the concrete. Formed surfaces shall receive an application of curing compound if forms are removed during the 7-day curing period. Curing compound shall not be applied during rainfall.

1. Apply one (1) coat of specified curing compound to concrete at the manufacturer's recommended rate. Apply uniformly in continuous operation by power-spray or roller. Care shall be taken to prevent application to joints where concrete bond is required, to reinforcement steel and to joints where joint sealer is to be placed. The compound shall form a uniform continuous coherent film which will not crack or peel and shall be free from pinholes and other imperfections. Concrete surfaces subjected to heavy rainfall within 3 hours after curing compound has been applied shall be resprayed by above method and at the above coverage at no additional expense to Owner.

2. Do not use membrane curing compounds on concrete surfaces which are to receive liquid floor hardener, waterproofing, damp proofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting, or other coatings and finish materials, unless the Contractor obtains written verification from the manufacturer that his product is compatible with the curing compound.

H. No pedestrian traffic shall be allowed over the surface for 7 days unless surface is protected by planks or plywood. The protection shall not be placed until at least 24 hours after application of curing materials (if applicable). No vehicular or equipment traffic shall be allowed over the surface for 30 days.

I. Protect concrete by suitable methods to prevent damage by mechanical injury or excessively hot or cold temperatures.

3.9 MISCELLANEOUS CONCRETE ITEMS

A. Interior Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on Drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment. Grout base plates and foundations as indicated, using specified non-shrink grout. Use non-metallic grout for exposed conditions, unless otherwise indicated.

C. Reinforced Masonry: Provide concrete grout for reinforced masonry lintels and bond beams where indicated on Drawings and as scheduled. Maintain accurate location of reinforcing steel during concrete placement. Refer to Concrete Unit Masonry Specification 04 22 00 for additional information.

3.10 CONCRETE SURFACE REPAIRS

A. Formed Surfaces: Normal form tie holes shall be filled with a sand-cement grout applied with a bonding agent. Defective areas due to spalls, air bubbles, honeycombing, or segregation with a void depth (after weak material is chipped out) greater than or equal to 1/2" shall be repaired with a concrete repair grout specified in this Section. The defective area shall be chipped out to solid concrete such that the thickness of patching material is at least 1/4" all around. Do not feather-edge. At defective areas exposed-to-view, the Engineer may

substitute a sand-cement grout applied with a bonding agent to more closely match the color of the wall.

B. Slabs:

1. Repair spalls and holes by sawcutting with square cuts and chipping to a minimum depth of 1/2" and patching with a concrete repair grout specified in Products section of this specification. Do not feather-edge.

2. Cracks in the slabs on grade up to ¼" wide are to be filled with sealant listed in Products section of this specification. Follow manufacturer's recommendations. Engineer shall be consulted for investigation and repair of cracks in slabs on grade that are larger than ¼" wide.

3. Cracks in the structural slabs and walls up to 1/8" wide are to be filled with sealant listed in the Products section of this specification. Follow manufacturer's recommendations for preparation and installation. Engineer shall be consulted for investigation and repair of cracks in structural slabs and walls that are larger than 1/8" wide.

4. Severely defective areas which cannot be repaired by one of the above methods shall be removed and replaced at the Contractor's expense.

C. Voids in concrete surfaces resulting from the removal of temporary anchors, shall be repaired with a concrete repair grout specified in Products section of this specification, per manufacturers recommendations.

D. For surface preparation and installation of concrete repair grouts, follow manufacturer's recommended procedures.

3.11 FIELD QUALITY CONTROL

A. Field sampling and testing shall be performed by an independent testing lab. Samples of concrete shall be taken at random locations from work and at such times to represent quality of materials and work throughout the project. The laboratory shall provide necessary labor, materials, equipment, and facilities for sampling concrete and for casting, handling and storing concrete samples at site of work. Sampling of concrete will be in accordance with ASTM C172. Samples for pumped concrete shall be taken at the hose discharge point. Samples for other concrete shall be taken at the hopper of concreting equipment or transit mix truck.

B. Contractor shall pay for the following services when required:

1. Additional testing and inspection required because of changes in materials or proportions requested by the Contractor.

2. Additional testing of materials or concrete occasioned by their failure by test or observation to meet specification requirements. For example, if compressive test results indicate concrete in place may not meet structural requirements, tests shall be made to determine if the structure or portion thereof is structurally sound. Tests may include, but not be limited

to, cores in accordance with ASTM C 42 and any other load tests acceptable to the Engineer. Costs of such tests will be borne by the Contractor.

C. To facilitate testing and observation, Contractor shall advise Owner and designated testing agency sufficiently in advance of operations to allow for the assignment of personnel and for completion of quality tests and checking of forms.

D. Strength Tests:

1. General – Strength of the concrete will be verified by the testing laboratory during placement of concrete. Verification shall be accomplished by testing standard cylinders of concrete samples taken at the job site.

2. Frequency – As a minimum, one set of four standard cylinders shall be cast of each class of concrete based on the most stringent of the following requirements as applicable:

   - for each 50 cubic yards or less
   - for each 4,000 square feet of surface area
   - for each day a pour is made

3. Lab Testing – Testing of specimens for compressive strength shall be made in accordance with ASTM C39. Tests shall be made at 3, 7 and 28 days from time of casting. One test cylinder from each group of six shall be tested at the end of 3 and 7 days and three shall be tested at the end of 28 days. One cylinder will be held in reserve. The 28-day strength test result shall be the average of the strengths of three test cylinders (cast from material taken from a single load of concrete) at 28 days.

4. Acceptance of Concrete Strength – Strength level of concrete will be considered satisfactory so long as the average of all sets of three consecutive strength results equal or exceed specified compressive strength and not more than 10% of strength test results shall have values less than specified value. No individual strength test shall be less than the specified compressive strength by more than 500 psi.

E. Slump Tests – The slump shall be as specified when measured in accordance with ASTM C 143. Samples for slump determination shall be taken from the concrete during placing. Tests shall be made at the beginning of concrete placing operations and at subsequent intervals to insure specification requirements are met. When concrete is pumped, slump tests shall be taken from the discharge end of pump hose. Slump tests shall also be performed whenever standard cylinders are cast.

F. Temperature and Air Content Tests: Temperature tests shall be made at frequent intervals during hot or cold weather conditions until satisfactory temperature control is established. Test hourly when air temperature is 40° F and below and when 80° F and above. Whenever standard cylinders are cast, temperature tests shall be performed. Air content tests shall be in accordance with ASTM C 231 and measured whenever standard cylinders are cast.

G. Contractor responsibilities regarding test specimens are as defined in ACI 301, including, but not limited to, the following:

1. Contractor shall provide and maintain adequate facilities on the project site for safe storage and initial curing of concrete test specimens as required by ASTM C 31/C 31M for the sole use of the testing agency.

2. Test specimens shall be stored and cured on site in a curing box, within a temperature range of 60-80 degrees Fahrenheit, without the loss of moisture, unless otherwise approved by Engineer.

H. Testing agency shall secure samples on the site at a location agreeable to both the testing agency and the Contractor. If samples are missing when collected by testing agency, Contractor shall compensate Owner in the amount of $1,000 per missing sample. Said compensation shall be deducted from the Contract Amount by Change Order. Contractor shall also be responsible for the cost of coring and testing the concrete from which the missing samples were taken, at the direction of the Engineer, as well as the cost to repair the cored areas.

I. Substandard Concrete: Any concrete furnished under this Specification that fails to reach the required design compressive strength after 28 days, as evidenced by the compressive strength test specified herein, shall be considered substandard.

1. The procedure specified in ACI 318 and 350 (as applicable) for the Evaluation and Acceptance of Concrete shall be used to determine if the substandard concrete is to be removed and replaced. The Engineer shall make the final decision. Any substandard concrete which is removed and replaced shall be done so at the Contractor's expense.

2. For substandard concrete which is left in place, the Contractor shall compensate the Owner an amount of $0.10 for each psi that the actual 28-day concrete strength is below the specified compressive strength for each cubic yard of concrete in the pour. The strength of concrete for a particular pour shall be the average of all but the one (1) lowest of the 28-day compression tests for that pour. Said compensation shall be deducted from the Contract Amount by Change Order.

3.12 WATER TIGHTNESS TESTING

Upon completion of finishing and curing, and prior to application of waterproof and anti-corrosion coatings, hydrostatic tests (HST), in accordance with ACI 350.1, shall be conducted on the 6 Basin structures, as detailed herein.

A. General:

1. Coordinate timing and procedures for obtaining testing water and structure testing with the Owner and Engineer, well in advance of the actual testing.

2. At least 30 days prior to conducting tests, prepare a Water Tightness Testing Program and submit to Engineer for review and acceptance. Program shall include timeline for installation and finalization of concrete, curing method(s) of concrete structures to be tested, duration of curing, and testing sequence for filling and monitoring specific Basins.

3. Test water shall be potable and shall be provided by the Contractor.

4. All labor, equipment and materials shall be supplied by the Contractor.

5. No backfill shall be placed against the walls of the basins until hydrostatic testing is complete and Engineer has authorized backfilling to occur.

B. Preparation:

1. Ground water level shall be brought to a level below that of the top of the base slab and kept at or below that elevation throughout the test.

2. Thoroughly clean the structure to be tested of dirt, mud and construction debris prior to initiating the hydrostatic tests. The floor and sumps shall be flushed with water to provide a clean surface, ready for testing.

3. Inspect the surfaces of all Basins to be tested for potential leakage paths such as cracks, voids etc. and repair such deficiencies, as directed in this Specification. Document any deficiencies with photographs and a corresponding location system.

4. Confirm presence and adequacy of seals around gates, valves, outlets and pipe penetrations. Engineer shall inspect for acceptance prior to commencement of testing.

5. Pipe wall sleeves with water stops and seals should be fully installed and securely capped prior to testing.

6. Weir openings shall be temporarily covered for purpose of testing.

7. Install two evaporation and precipitation measurement devices, as defined in ACI 350.1.

8. Two thermometers shall be installed on the Basin being tested for the purpose of monitoring air temperature throughout testing. A thermometer to measure the water temperature shall also be provided.

C. Testing:

1. Conditions of Testing:

a. Do not begin initial filling of concrete structures until all concrete elements of the structure have attained the design compressive strength of the concrete. Contractor shall assume this duration to be 28 days from placement, but Engineer reserves right to modify this duration based upon concrete test results and selected curing method(s).

b. Do not begin initial filling of concrete structures until all walls and base slabs have been coated with the designated waterproofing and corrosion resistant systems and proper curing time has been achieved (per manufacturer).

c. The test measurements shall not be scheduled for a period when the forecast is for a substantial change in the weather pattern (35-degree temperature differential from commencement to conclusion). The test

shall also not be scheduled when the weather forecast indicates the water surface may freeze before the test is completed.

d. Initial filling rate shall conform to the requirements of ACI 350.1 and shall not exceed four (4) feet per hour.

e. Contractor shall notify Engineer a minimum of three (3) days prior to testing.

2. Execution:

a. Hydrostatic tests shall include HST-VIO followed by HST-100, as defined in ACI 350.1.

b. Basins shall be tested independently as follows (refer to Drawings for basin names and locations):

i. Anoxic Basin, one Membrane Basin and one Pre-Aeration Basin (not adjacent to the Membrane Basin being tested) shall be tested first and in conjunction with each other.
ii. Remaining Membrane Basin and Pre-Aeration Basin shall be tested second.
iii. Chlorine Contact Basin can be tested in conjunction with any of the above.

c. Where possible, contractor shall recycle test water from the Basin(s) most recently tested into the Basin(s) scheduled to be tested next. If excess water remains in the Basin(s) most recently tested, it shall be drained and/or pumped out.

d. Contractor shall wait to perform tests on designated Basin(s) until the surrounding Basins walls and slabs are dry. Contractor may use fans to dry out basins quickly, if desired.

e. Photographs of all Basins, clearly identifying the Basin(s) to be tested, shall be taken just prior to testing to document that the surrounding Basins are dry. If surrounding Basins are not dry, test results shall be voided.

f. The Basin(s) to be tested shall be filled with water at a maximum rate of four (4) feet per hour, to elevation of 2' below the top and shall be left to stabilize for three (3) days.

g. Damp spots and standing water on surrounding surfaces due to spillage during process of filling the Basin(s) shall be absorbed and/or dried prior to commencement of testing so as not to be confused with leakage.

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h. Conduct HST-VIO: From the time that test Basin(s) are filled and throughout the duration of the test, all wall and slab surfaces surrounding the test Basin(s) shall be inspected daily for visible indications of leakage. If, during the first three (3) days of filling (prior to commencement of test) any flow of water is observed from the Basin exterior surfaces, including joints or cracks, the defect causing the leakage shall be repaired. After

testing has begun, any visible indications of leakage shall be viewed as failure.

i. After three (3) days, the water level in the test Basin(s) shall be measured and recorded and the test shall begin. Measure water surface elevation at not less than four (4) locations, 90 degrees apart. Record water temperature 18 inches below the surface for all measurements.

j. The vertical distance to the water surface shall be measured from a fixed point on the tank above the water surface. Measurements shall be taken at the same locations each time they are recorded.

k. Conduct HST-100: Test shall consist of measuring the liquid level over the next **48 hours** to determine any change that occurs, taking measurements at 24-hour intervals. The maximum permissible loss is **0.1 percent of water volume**. The loss of volume shall be determined by measuring the drop-in water surface elevation and calculating the change in volume of the contained water.

l. If the change observed in 48 hours exceeds the maximum allowable, the test shall be extended to a total of five (5) days with testing every 24 hour period. If, at the end of the five (5) days, the average daily change has not exceeded the maximum allowable loss, the test shall be considered satisfactory.

m. Engineer shall be present at the end of the 24-hour test period to observe all wall and slab surfaces surrounding test Basin(s) for visible indications of leakage.

n. Evaporation and rainfall during testing shall be measured and recorded at commencement of test and every 24 hours, in conjunction with the water level measurements.

o. Air temperature shall be recorded at the commencement of testing and again every six (6) hours throughout testing.

p. If, at any time during the filling and/or testing procedure, visible signs of leakage are observed, photographs shall be taken and Engineer shall be notified immediately. If, for safety reasons, Engineer deems it necessary, the testing process may be stopped.

3. Reports: Testing reports shall be provided for each Basin tested and shall include the following information:

a. Date and time of commencement of test.

b. Initial water elevation and corresponding volume (taken at 4 locations).

c. Subsequent water elevations (taken at 4 locations every 24 hours) and corresponding volume, calculated using the average of the four (4) elevations.

d. Initial water levels and volume of evaporation and precipitation sample.

e. Subsequent water levels of evaporation and precipitation sample.

f. All air and water temperatures readings throughout testing and the times at which they were recorded.

g. Calculation showing conformance or nonconformance with maximum loss.

h. Date, time, duration and measurement of rainfall.

4. Failure: The following conditions shall be considered as NOT meeting criteria for acceptance, regardless of the actual loss of water volume measured:

   a. Water volume loss exceeding allowable.

   b. Ground water leakage into the structure.

   c. Structures which exhibit water flowing from the Basin(s) or from beneath the foundation (except for under-drain systems).

   d. Presence of damp spots on surfaces. Damp spots are defined as spots where moisture can be picked up by a dry hand from the exterior surface.

5. Repairs and Retesting:

   a. A restart of the test shall be required when test measurements become unreliable due to unusual precipitation or other external factors.

   b. Structures failing the hydrostatic tests and not exhibiting visible leakage may be retested after an additional stabilization period of not less than three (3) days. Basins that fail the second test shall be investigated and repaired prior to additional tests.

   c. Repair structures which fail the hydrostatic tests and structures showing visible leakage under the direction of the Engineer.

   d. The expense of repairs and retesting, including consultation of the Engineer, shall be borne by the Contractor at no additional cost to the Owner.

6. Conclusion:

   a. Following successful completion of all hydrostatic testing, the test water shall be disposed of by draining and/or pumping out of the Basins.

   b. All surfaces shall be dry prior to application of waterproof and anti-corrosion coatings. The coating manufacturers shall be consulted regarding the recommended moisture content of the concrete surfaces to be coated. This may entail moisture testing of the concrete surfaces. If surfaces are too moist for coating, Contractor shall follow procedural

recommendations from coating manufacturers to obtain acceptable levels for application of coatings.

END OF SECTION

INDEX TO

SECTION 03 40 00

PRECAST CONCRETE

SECTION 03 40 00

PRECAST CONCRETE

PART 1 – GENERAL

1.01 PURPOSE

A. This Section intended to provide Contractor with applicable information related to any precast boxes and manholes required for the site. It does not apply to precast concrete piles.

1.02 SCOPE

A. This Section is limited to precast concrete structures.

1.03 REFERENCES (LATEST REVISION)

A. Not Used

1.04 SUBMITTALS

A. Submittals for Review:

1. Calculations and Technical Design Data (including codes & loads) for each precast item, signed and sealed by a professional engineer registered in the State of Georgia.

2. Shop Drawings and calculations for each precast item.

a. Shop Drawings that clearly show dimensions, elevations, sizes, proposed details, and concepts for slabs, precast boxes and manholes, and their included accessories, signed and sealed by a professional engineer registered in the State of Georgia.

B. Informational Submittals:

1. For Precasting Manufacturers Not Listed in Article Quality Assurance:

a. Experience record on production of precast concrete as shown, with information on precasting plant that will indicate capability to satisfactorily perform the Work.

b. Evidence of current PCI plant certification.

2. Certificate of Compliance: Certify admixtures and concrete do not contain calcium chloride.

3. Test Reports:

a. For precast manufacturer's concrete test cylinders.

b. Inspection of installed units.

1.05 QUALITY ASSURANCE

A. Qualifications of Precasting Manufacturers:

1. Precast Concrete and Precast Prestressed Concrete: Product of manufacturer with three years' experience producing precast concrete products of quality specified.

2. Precast Plant(s): PCI certified plants with current certification.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Formwork, Reinforcing, Cement, Aggregates, Admixtures, Grout:

1. As specified in Section 03 30 00, Cast-in-Place Concrete.

B. Embedded Items:

1. ASTM A36 steel.

2. Anchor Studs: Headed anchor studs (HAS), deformed bar anchors (DBA), or threaded studs as manufactured by Nelson Stud Welding Co., Lorain, OH. '

3. Furnish inserts for lifting tilt-up walls, bolting stiffeners, attaching braces, and as otherwise required.

2.02 CONCRETE MIX

A. As specified in Section 03 30 00, Cast-in-Place Concrete.

B. Design Strength: 4,500 psi at 28 days, minimum.

C. Water/Cement Ratio: 0.40 maximum.

D. Durability Requirements: Concrete mix shall be suitable for moderate sulfate exposure per Table 4.3.1 of ACI 318.

2.03 DESIGN AND CONSTRUCTION REQUIREMENTS

A. Structural Precast Units:

1. Design for loads specified on the structural Construction Drawings:

2. Conform to recommendations in the following standards and specifications:

   a. PCI MNL-116, Manual for Quality Control for Plants and Production of Structural Precast Concrete Products.

   b. PCI MNL-I20, PCI Design Handbook – Precast and Prestressed Concrete.

   c. PCI MNL-I35, Tolerance Manual for Precast and Prestressed Concrete Construction.

   d. ASTM C478, Standard Specifications for Precast Reinforced Concrete Manhole Sections.

   e. ASTM C890, Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.

   f. ASTM C913, Standard Specifications for Precast Water and Wastewater Structures.

3. In event of conflicting criteria, most severe governs.

2.04 FABRICATION

A. General:

1. Comply with PCI MNL-116, Manual for Quality Control for Plants and Production of Structural Precast Concrete Products.

2. Reinforcing Steel:

   a. Place in position before concrete is cast.

   b. Keep clean and free from oil or other substances harmful to bond.

3. Forms: Produce smooth surfaces.

4. Concrete: Deposit, vibrate, finish, and cure in accordance with recommended practices of ACI 304R. Steam curing is permitted.

5. Coordinate dimensions, determine type, quantity, size, and location of, and furnish necessary embedded items in precast concrete. Coordinate location of embedded items in cast-in-place concrete necessary to connect precast items.

B. Surface Finish for Precast Boxes & Manholes: smooth.

2.05 SOURCE QUALITY CONTROL

A. Prepare minimum three standard concrete test cylinders for each 50 cubic yards or fraction thereof of concrete placed in the precast work in accordance with ASTM C31.

B. Test and record concrete strengths as required in Section 03 30 00 Cast-In-Place Concrete.

PART 3 – EXECUTION

3.01 ERECTION

A. Verify that anchorage inserts are in correct locations.

B. Handle and erect precast concrete with care as recommended by manufacturer.

C. Erect precast units plumb, straight, level, square, and in proper alignment.

D. Fasten units securely in place and brace to maintain position, stability, and alignment until permanently connected and structure is complete and stable.

E. Field Cutting: Not allowed without prior approval of Contractor.

3.02 PATCHING

A. Mix and place patching mixture to match color and texture of surrounding concrete and to minimize shrinkage.

B. Demonstrate patching method and obtain acceptance and approval.

3.03 CLEANING

A. After installation, clean soiled precast concrete surfaces with detergent and water, using fiber brush and sponge.

B. Use acid solution only to clean particularly stubborn stains after more conservative methods have been tried unsuccessfully.

C. Use extreme care to prevent damage to precast concrete surfaces and to adjacent materials.

D. Rinse thoroughly with clean water immediately after using cleaner.

3.04 FIELD QUALITY CONTROL

A. Inspection:

1. With Engineer's Inspector, inspect units for chips, cracks, and other damage.

2. Record location and condition of damaged or nonmatching units.

B. Resolution:

1. Repair damage to satisfaction of Engineer.

2. Remove units with damage or repairs not acceptable to Engineer.

3. Install new acceptable units in place of those removed.

4. Perform reinspection and obtain acceptance by Engineer.

3.05 PROTECTION

A. Protect precast units from chipping, spalling, cracking, or other damage to the units after delivery to Site.

B. After erection, protect units from damage.

END OF SECTION

INDEX TO

SECTION 03 63 00 – CONCRETE DOWELING

SECTION 03 63 00

CONCRETE DOWELING

PART 1 – GENERAL

1.01 PURPOSE

A. This Section intended to provide Contractor with applicable information related to doweling reinforcing steel into existing concrete using an adhesive anchoring system.

1.02 SCOPE

A. This Section is for doweling reinforcing steel into existing concrete using an adhesive anchoring system.

1.03 DEFINITIONS, REFERENCE CODES, SPECIFICATIONS, AND STANDARDS

A. Refer to Section 03 00 00, Concrete Definitions and Reference Codes, Specifications, and Standards for information applicable to this Section.

1.04 SUBMITTALS

A. Action Submittals:

1. Product Data: Manufacturer's catalog information.

B. International Submittals:

1. Manufacturer's instructions for preparation, placement, drilling of holes, installation of anchors and adhesive, and handling of cartridges, nozzles, and equipment.

2. ICC-ES Reports:

a. Doweling system manufacturer.

b. Detailed step-by-step instructions for Inspection Procedure.

3. Inspection Report.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Installer: Trained and certified by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store adhesive cartridges on pallets or shelving a covered storage area.

B. Store at temperatures as indicated in manufacturer's literature and ICC-ES report.

C. Dispose of When:

1. Shelf life has expired.

2. Stored other than per manufacturer's instructions.

D. Container Markings: Include manufacturer's name, product name, batch number, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions.

PART 2 – PRODUCTS

2.01 ADHESIVE

A. Disposable, self-contained cartridge system capable of dispensing both components in the proper mixing ratio and that fit into manually or pneumatically operated caulking gun.

B. Meet requirements of ASTM C881/C881M.

C. Two-component, insensitive to moisture, designed to be installed in adverse freeze/thaw environments.

D. Cure Temperature, Pot Life, and Workability: Compatible for intended use and anticipated environmental conditions.

E. Mixed Adhesive: Nonsag light paste consistency with ability to remain in a l-inch-diameter overhead drilled hole without runout.

F. Adhesive Anchorage System shall be certified to meet AC308.

G. Manufacturers and Products: Hilti, Inc., Tulsa, OK; HIT Doweling Anchor System, HIT RE 500-SD (HIT HY 20 for hollow masonry).

2.02 MIXING NOZZLES

A. Disposable, manufactured in several sizes to accommodate size of reinforcing dowels.

2.03 REINFORCING DOWELS

A. As specified in Section 03 21 00, Reinforcing Steel.

B. Smooth Epoxy-Coated Expansion Joint Dowels: As specified in Section 03 15 00, Concrete Accessories.

PART 3 – EXECUTION

3.01 GENERAL

A. Install in accordance with manufacturer's recommended instructions.

B. Dispense components through specially designed static mixing nozzle that thoroughly mixes components and places mixed adhesive at base of predrilled hole.

3.02 DOWEL SIZING AND INSTALLATION

A. Install per adhesive manufacturer's instructions.

B. Drilling Equipment:

1. Drilling Hammers for Dowel Holes: Electric or pneumatic rotary type with medium or light impact.

2. Hollow drills with flushing air systems are preferred.

3. Where edge distances are less than 2 inches, use lighter impact equipment to prevent microcracking and concrete spalling during drilling process.

C. Hole Diameter: Use drill bit diameter meeting ICC-ES Report requirements and as recommended by the manufacturer.

D. Obstructions in Drill Path:

1. When existing reinforcing steel is encountered during drilling and when approved by Engineer, enlarge hole by *1/8* inch, core through existing reinforcing steel at the larger diameter, and resume drilling at original hole diameter; or redrill hole 1 inch from original location, beginning in same line at surface, redirecting drill to miss reinforcing steel.

2. Place dowels in both the misdrilled hole and the new one.

3. When using epoxy anchors, dowels may be prebent prior to installation to 15 degrees to align with other bars. Do not heat dowels to bend.

4. If bars have fused epoxy coating and coating is damaged, recoat damaged area with epoxy.

5. Bent Bar Dowels: Where edge distances are critical, and striking reinforcing steel is likely, drill hole at 10 degree angle or less and use prebent reinforcing bars.

3.03 FIELD QUALITY CONTROL

A. Dowel Testing:

1. Test every dowel for the first ten dowels. Provided every dowel passes, frequency of test may be reduced to every other dowel for the next ten dowels. Provided every dowel passes, frequency of test may be reduced to every fourth dowel. Upon failure of test, previous ten dowels must be tested, and graduated frequency of tests must start over.

2. Dowels shall be tested to specified yield strength of reinforcing *bar.*

3. Testing apparatus shall not interfere with development of concrete failure cone at dowel.

4. Testing shall occur only after adhesive has achieved proper cure per manufacturer's requirements.

5. Failure of reinforcing bar or of base concrete will cause dowel to be rejected. Rejected dowels shall be reinstalled in sound concrete and retested.

6. If yield strength of reinforcing bar cannot be achieved when tested, manufacturer's representative shall recommend revised installation procedures or adhesive products. Modified installations must be tested at same frequency as specified herein.

B. Inspection:

1. Inspector shall be onsite during dowel installation.

2. Inspector shall observe installation and shall submit report containing the following:

   a. Drill bit compliance.

   b. Hole depth and cleanliness.

   c. Product Description: Product name, rod diameter, and length.

   d. Adhesive expiration date.

   e. Verification of dowel installation in accordance with manufacturer's published instructions.

   f. ICC-ES Report.

C. Manufacturer's Field Services: Provide manufacturer's representative at Site in accordance with Section 01 0001, General Requirements, for installation assistance, inspection, and certification of proper installation.

END OF SECTION

INDEX TO

SECTION 04 22 00 – CONCRETE UNIT MASONARY

SECTION 04 22 00

CONCRETE UNIT MASONRY

PART 1 – GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Concrete Institute (ACI):

   a. 530.1/ASCE 6/TMS 602, Building Code Requirements for Masonry Structures and Specifications for Masonry Structures and Related Commentaries.

   b. ACI SP-66, ACI Detailing Manual

2. ASTM International (ASTM):

   a. A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

   b. A153, Standard specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

   c. A167, Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

   d. A615, Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

   e. C33, Standard Specification for Concrete Aggregates.

   f. C62, Building Brick (Solid Masonry Units Made from Clay or Shale)

   g. C67, Sampling and Testing Brick and Structural Clay Tile

   h. C90, Standard Specification for Loadbearing Concrete Masonry Units.

   i. C91, Masonry Cement

   j. C94, Ready Mixed Concrete

   k. C140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.

   l. C144, Standard Specification for Aggregate for Masonry Mortar.

   m. C150, Standard Specification for Portland Cement.

n. C270, Standard Specification for Mortar for Unit Masonry.

o. C476, Standard Specification for Grout for Masonry.

p. C494, Chemical Admixtures for Concrete

q. C578, Rigid, Cellular Polystyrene Thermal Insulation

r. C744, Standard Specification for refaced Concrete and Calcium Silicate Masonry Units.

s. C780, Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry

t. C1019, Sampling and Testing Grout

u. C1072, Measurement of Masonry Flexural Bond Strength

v. C1142, Extended Life Mortar for Unit Masonry

w. C1289, Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

x. C1314, Standard Test Method for Compressive Strength of Masonry Prisms.

y. C2287, Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds

z. E514, Standard Test Method for Water Penetration and Leakage through Masonry.

3. Brick Institute of America (BIA).

4. International Code Council (ICC):

a. International Building Code (IBC) Chapter 21.

b. ICC Evaluation Service (ICC-ES) Reports.

5. National Concrete Masonry Association (NCMA).

1.02 SUBMITTALS

A. Submittals for Review:

1. Product Data:

a. Accessories.

b. Concrete Masonry Units (CMU).

c. Mortar - include required environmental conditions, admixture limitations and manufacturer's instructions for packaged dry mortar installation.

d. Reinforcement.

2. Certificates:

a. Manufacturer letters of certification stating materials meet or exceed the specified requirements.

B. Informational Submittals:

1. Statement of Acknowledgement of Quality Assurance Plan in accordance with IBC Section 1705.3.

1.03 QUALITY ASSURANCE

A. Compliance: Comply with the requirements and criteria of the NCMA, BIA, ASTM C90, ASTM C216, and ACI 530.1 for masonry finish and appearance, dimension tolerances, tolerances of construction, joint tolerances, and wall plumb tolerances.

B. Spare Vibrator: Maintain at least one spare vibrator on site at all times.

C. Bracing and Scaffolding: Provide bracing and scaffolding necessary for masonry work. Design bracing to resist wind pressure as required by local code.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered, handled, stored, and protected to avoid chipping, breakage, and contact with soil or contaminating material.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Temperature: Do not lay masonry when ambient temperature is below 32 degrees F on a rising temperature, or below 40 degrees F on a falling temperature, or when there is a probability of such conditions occurring within 48 hours, unless written approval of procedure for protection from freezing is obtained from Engineer. Comply with requirements of ACI 530.1/ASCE 6/TMS 602 or applicable building code, whichever is more stringent.

B. Moisture Protection: Protect masonry construction from loss of moisture during curing period of 7 days when ambient air temperature is 90 degrees F or greater and when relative humidity is less than 50 percent.

PART 2 – PRODUCTS

2.01 MASONRY UNITS

A. General:

1. Furnish or cut special shapes for corners, jambs, lintels, and other areas shown or required.

2. Special units shall match properties of standard units.

3. Where units are placed so end of unit is exposed, such as at a corner or intersection, exposed end of that block shall have surface to match color and texture of sides of other units.

4. Furnish sound, dry, clean units free of cracks, prior to placing in structure.

5. Vertical Cells to be Grouted: Capable of alignment sufficient to maintain clear, unobstructed continuous vertical cell dimensions in accordance with ACI 530.1, Table 7.

6. Masonry unit size and shape shall allow for all placement patterns to prevent materials, such as grout or poured insulation, from escaping from cell being filled to adjacent cells where material is not intended to be placed.

B. Plain Face Concrete Masonry Units (CMU):

1. Load Bearing Units: ASTM C90: lightweight, hollow block, grouted as indicated.

2. Nominal Size: 16 inches long by 8 inches high by thickness shown on Drawings.

3. Minimum Compressive Strength, f'_m: 1,500 psi

4. Color of Units: Natural.

5. Surface Texture: Smooth.

C. Decorative Concrete Masonry Units:

1. Texture: Split face and smooth face, as indicated.

2. Colors: As selected by Architect.

3. Manufacturers: Subject to compliance with requirements, provide selected products by one of the following:

a. Cemex.

b. Johnson Cement Co.

c. Trenwyth Industries/Oldcastle.

D. Integral Water Repellent for Decorative Concrete Units: Provide units made with integral water repellent for exposed units. Provide one of the following:

1. Headwaters Construction Materials; Eucon BlockTite.

2. Grace Construction Products; Dry-Block.

3. BASF; Rheopel.

2.02 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM CI50, Type I.

B. Lime: ASTM C207, Type S hydrated.

C. Aggregates:

1. Mortar: ASTM C144, sand.

2. Grout: ASTM C404.

D. Water: Fresh, clean, and potable.

E. Colored Cement for Decorative Concrete Masonry: Packaged blend made from mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients. Provide one of the following:

1. Essroc; Flamingo Color Masonry Cement.

2. Holcim; Rainbow Mortamix Custom Color Masonry Cement.

3. Lehigh; Lehigh Custom Color Masonry Cement.

F. Mortar Mix:

1. Mortar for Unit Masonry, Type S in accordance with ASTM C270.

2. Minimum 28-day compressive strength of 2,100 psi.

G. Grout:

1. For bond beams, lintels and vertically reinforced cells.

2. Grout shall be in accordance with ASTM C476, premixed type in accordance with ASTM C94.

3. Consistency required to fill completely the volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less;

coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

4. Minimum 28-day compressive strength of 3,000 psi. Slump: 8 inches to 11 inches.

2.03 REINFORCEMENT

A. Horizontal Joint Reinforcement:

1. Truss or ladder type, ASTM A82, 9ga, galvanized.

2. Reinforcement: Clean and free from loose rust, scale, and coatings that reduce bond.

3. Furnish special manufactured corner and wall intersection pieces.

4. Manufacturer: Dur-O-Wal, Inc., Aurora, IL.

B. Deformed Bars: As specified in Section 03 30 00 Cast-In-Place Concrete.

2.04 PREFORMED CONTROL JOINTS

A. Solid rubber cross-shape extrusions as manufactured by:

1. Wire-Bond, Rubber Control Joint.
2. Hohmann and Barnard, Inc; RS Series.

PART 3 – EXECUTION

3.01 GENERAL

A. Protect masonry construction to prevent efflorescence. Provide measures to prevent moisture from entering incomplete walls.

3.02 PREPARATION

A. Prepare surface contact area of foundation concrete for initial mortar placement by one of following methods:

1. Sandblasting foundation and reinforcing dowels after concrete has fully cured to remove laitance and spillage and to expose sound aggregate.

2. Water blasting foundation and reinforcing dowels after concrete has partially cured to remove laitance and spillage and to expose sound aggregate.

B. Clean surfaces of loose material prior to initial mortar placement.

C. Prevent surface damage to foundation concrete that will be exposed to view outside of contact area.

3.03 LAYING MASONRY UNITS

A. General:

1. Conform to building code applicable to this Project and as supplemented by these Specifications.

2. Do not start laying masonry units unless foundation wall is plumb within 1/4 inch in 10 feet or not straight within 5/16 inch in 10 feet.

3. Finish Tolerances (Measured on Interior surfaces):

d. Maximum permissible variation from plumb of masonry wall or line of joints in masonry wall: 1/16 inch per foot of height and 1/4 inch in total height of wall.

e. Maximum permissible variation from horizontal line along base of wall or for lines of horizontal joints: 1/16 inch per block and 1/4 inch per 50 feet of wall with proportionately greater tolerance for longer walls up to 1/2 inch in total length of wall.

4. Place units with chipped edges or corners such that chipped area is not exposed to view.

B. Wall Units:

1. General:

a. If necessary to move a unit after set in-place, remove from wall, clean, and set in fresh mortar.

b. Toothing of masonry units is not permitted.

2. Running Bond:

a. Unless otherwise shown, lay up walls in straight, level, and uniform courses using a running bond pattern.

b. Place units for continuous vertical cells and mortar joints to prevent materials, such as grout or poured insulation, from escaping from cell being filled to adjacent cells where material is not intended to be placed.

3. Corners: Lay standard masonry bond for overlapping units and grout solid.

4. Intersecting Walls: Bond with reinforcement, not with masonry bond.

C. Special Shapes:

1. Provide and place such special units as corner block, doorjamb block, lintel block fillers, and similar blocks as may be required.

2. Use required shapes and sizes to work to corners and openings, maintaining proper bond throughout wall.

3.04 BUILT-IN ITEMS

A. Position door frames, windows, vents, louvers, and other items to be built in wall, and construct wall around them.

B. Install masonry anchors to secure items to wall.

C. Fill spaces around items with mortar or grout.

D. Do not place electrical, instrumentation, or water conduits in a cell containing reinforcement, unless approved in writing by Engineer. Pipes, sleeves, and conduits shall not be placed closer than three diameters, center-to-center, nor shall they impair strength of construction.

3.05 MORTAR JOINTS

A. General:

1. Straight, clean, with uniform thickness of 3/8 inch.

2. Horizontal and vertical mortar joints shall have full mortar coverage on face shells.

3. Vertical Head Joints:

a. Butter well on each unit for a width equal to face shell of unit, shove tightly so mortar bonds well to both units.

b. Solidly fill joints from face of block to at least depth of face shell.

4. As units are laid, remove excess mortar from grout space of cells to be filled.

5. Place mortar before initial setting of cement takes place. Do not retemper mortar that has started to set or is not used within one hour. Retempering of colored mortar is not allowed.

B. Exposed Joints:

1. Tool joints exposed to view after final construction, unless otherwise noted or shown.

2. Cut joints flush and as mortar takes its initial set tool to provide a concave joint.

3. Perform tooling when mortar is partially set but still sufficiently plastic to bond.

4. Perform tooling with tool that compacts mortar, pressing excess mortar out rather than dragging it out.

5. Rake out joints that are not tight at time of tooling, point, and then tool.

6. Rake and tool joints at split-face surfaces interior and exterior.

C. Concealed Joints: Strike flush with no further treatment required.

3.06 CONTROL JOINTS

A. Preformed Control Joints:

1. Omit mortar from vertical joints.

2. Place rubber control joint material as wall is built.

3. After wall is grouted, cured, and cleaned, install backing rod and sealant as specified in Section 07 92 00, Joint Sealants.

4. Place and tool sealant to match depth of typical joint.

5. Maximum spacing from all corners shall be 20 times wall thickness, maximum spacing between joints shall be 40 times wall thickness.

3.07 REINFORCING

A. Foundation Dowels:

1. Size, number, and location of foundation dowels shall match vertical wall reinforcing, unless otherwise noted.

2. When foundation dowel does not line up as intended, with vertical core, do not slope more than 1 horizontal to 6 vertical to bring it into alignment.

B. Vertical Reinforcing:

1. Use deformed bars.

2. Hold in position near the ends of bars by wire ties to dowels or by reinforcing positioners.

3. Lap reinforcing bars as shown, where spliced and wire tie together.

4. Minimum Bar Clearance: One bar diameter from masonry and from additional parallel bars in same grout space.

5. Hold in position at maximum intervals of 160 bar diameters by reinforcing positioners.

C. Horizontal Reinforcing:

1. Use deformed bars.

2. Lay on webs of bond beam units and place as wall is built.

3. Lap reinforcing bars as shown, where spliced and wire tie together.

4. Minimum Bar Clearance: One bar diameter from masonry and from additional parallel bars in same grout space.

5. Terminate reinforcing bars 2 inches clear from control joints as shown.

D. Horizontal Joint Reinforcement:

1. Use for stack bond.

2. Provide in addition to typical wall reinforcing steel.

3. Space maximum 16 inches apart, vertically.

4. Lap ends 6 inches minimum.

5. At control joints make reinforcement discontinuous.

6. Use manufactured corner and other wall intersection pieces.

3.08 MORTAR PRODUCTION

A. General:

1. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use. Mix ingredients 3 minutes to 5 minutes after all ingredients are introduced.

2. Provide volumetric control by using batching box or similar measuring device. Do not use shovel to introduce materials directly into batch.

3. Maintain sand uniformly damp immediately before the mixing process.

4. Use cool mix water.

5. Do not use anti-freeze compounds to lower the freezing point of mortar.

6. If water is lost by evaporation, re-temper only within two hours of mixing.

3.09 GROUTING

A. General:

1. Do not mix, convey, or place with equipment constructed of aluminum.

2. Secure vertical and horizontal reinforcement, ties, bolts, anchors, and other required embedments in place; inspect and verify before placing grout.

3. Grout beams over openings in one continuous operation.

4. Maintain vertical alignment in ACI 530.1, Table 7.

5. Maximum grout pour shall be 5'-0", unless otherwise approved, in writing, by Engineer.

6. Place grout as soon as possible after mortar has set to reduce shrinkage cracking of vertical joints.

7. Vertical Reinforcement:

   a. First wire tie to foundation dowels, then build wall around it.

   b. Provide reinforcing positioners or a proved cross bracing to secure top of steel in place.

   c. Do not drop in vertical steel after block is laid, unless reinforcing positioners are provided in the course above previously grouted course.

B. Grouting Requirements:

1. Brace masonry to resist wet grout pressure.

2. Do not start grouting until wall has cured for 24 hours, minimum.

3. Partial Grouting Requirements:

   a. Walls Not Requiring Solid Grouting: Fill cells containing reinforcing steel, anchor bolts, and other embedded items as shown with grout.

   b. Construct cells to be filled to confine grout within cell.

   c. Cover tops of unfilled vertical cells under a bond beam with metal lath to confine grout fill to bond beam section.

4. Form horizontal construction joints between pours by stopping grout pour 1–1/2 inches below a mortar joint, except at a bond beam; stop pour 1/2 inch below top of masonry unit.

5. Partial Grouting with Insulation Fill:

   a. Where cells of masonry units are to receive masonry fill insulation in some cells and to receive grout in some cells, provide continuous

mortar on block webs on each side of cells to be filled with grout to ensure insulation without enter grout cells.

b. Where bond beams are required with masonry fill insulation and grout, limit pours to less than 5 feet in height.

6. Fully embed horizontal steel with grout in an uninterrupted pour.

7. Do not construct wall more than one course above top of grout pour prior to placing grout.

8. Vibration:

a. Use internal "pencil" type, low energy vibrator to thoroughly consolidate grout and reduce amount of air voids. Do not use concrete vibrators.

b. After waiting sufficient time to permit grout to become plastic, but before it has taken any set, reconsolidate grout.

c. Waiting period will vary depending upon weather conditions and block absorption rates, but under "normal" weather conditions with average masonry units the waiting period should be between 30 minutes to 60 minutes.

9. Cleanouts:

a. Provide for grout pours over 5 feet in height.

b. Provide for sufficient size to permit cleaning of cell, positioning of reinforcing, and inspection at bottom of every vertical cell containing reinforcing.

c. Location: Concealed from view after final construction, unless otherwise approved by Owner.

d. After wall has been inspected and approved and prior to grouting, cap cleanouts in a manner that will seal them from grout *leakage* and provide a flush finish.

3.10 FIELD QUALITY CONTROL

A. Masonry shall be tested by independent testing agency, retained by Owner, in accordance with ASTM C1314, Method B, as modified by ACI 530.1/ASCE 6.

B. Masonry test samples, when required, shall be constructed onsite with same materials and workmanship to be used for Project.

C. Provide adequate facilities for safe storage and proper curing of masonry prisms, mortar samples, and grout samples, as applicable, onsite for first 24 hours, and for additional time as may be required before transporting to test lab.

D. Masonry Testing:

1. Unit Strength Method:
   a. Method and frequency for mortar, grout, and masonry unit sampling and testing in accordance with IBC 2105.2.2.1.

   b. Provide masonry units for test samples required.

E. Corrective Action:

1. If compressive strength tests made prior to construction of permanent structure fail to meet Specifications, adjustments shall be made to mix designs for mortar, or grout, or both, as needed to produce specified strength. Masonry units shall also be tested to verify compliance to requirements of ASTM C90, Type 1.

2. If strength tests performed on materials representative of in-place construction fail to meet Specifications, prisms or cores shall be cut from constructed walls in sufficient locations to adequately determine strength in accordance with IBC 2105.3.

3.11 CLEANING

A. Immediately after completion of grouting, clean masonry surfaces of excess mortar, grout spillage, scum, stains, dirt, and other foreign substances using clean water and fiber brushes.

3.12 PROTECTION OF INSTALLED WORK

A. Do not allow grout and mortar stains to dry on face of exposed masonry.

B. Protect tops of walls at all times. Cover tops of walls with waterproof paper when rain or snow is imminent and when the Work is discontinued.

C. Adequately brace walls until walls and roof are completed.

D. Provide sufficient bracing to protect walls against damage from elements, including wind and snow.

E. Protect masonry against freezing for minimum 2 hours after being laid.

F. Protect masonry from damage until final acceptance of the Work. Damaged units will not be accepted.

END OF SECTION

INDEX TO

SECTION 05 05 23 – WELDING

SECTION 05 05 23

WELDING

PART 1 – GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Society of Mechanical Engineers (ASME):

   a. *BPVC* SEC V, Nondestructive Examination.

   b. BPVC SEC IX, Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators.

2. American Society of Nondestructive Testing (ASNT): SNT -TC-IA, Personnel Qualification and Certification in Nondestructive Testing.

3. ASTM International (ASTM): A370, Standard Test Methods and Definitions for Mechanical Testing of Steel Products.

4. American Welding Society (AWS):

   a. A2.4, Standard Symbols for Welding, Brazing, and Nondestructive Examination.

   b. A3.0, Standard Welding Terms and Definitions; Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting and Thermalspraying.

   c. *D1.1/D1.1M,* Structural Welding Code -Steel.

   d. D1.2/D1.2M, Structural Welding Code -Aluminum.

   e. D1.3, Structural Welding Code -Sheet Steel. *D1.4/D1.4M,* Structural Welding Code -Reinforcing Steel.

   f. *D1.6/D1.6M,* Structural Welding Code -Stainless Steel.

   g. QCI, Standard for AWS Certification of Welding Inspectors.

1.02 ABBREVIATIONS

A. CJP: Complete Joint Penetration.

B. CWI: Certified Welding Inspector.

C. MT: Magnetic Particle Testing.

D. NDE: Nondestructive Examination.

E. NDT: Nondestructive Testing.

F. PJP: Partial Joint Penetration.

G. PQR: Procedure Qualification Record.

H. PT: Liquid Penetrant Testing.

I. RT: Radiographic Testing.

J. UT: Ultrasonic Testing.

K. VT: Visual Testing.

L. WPQ: Welder/Welding Operator Performance Qualification.

M. WPS: Welding Procedure Specification.

1.03 SUBMITTALS

A. Shop Drawings:

1. Shop and field WPSs and PQRs.

2. NDT procedure specifications prepared in accordance with ASME BPVC SEC V.

3. Welding Data (Shop and Field):

a. Show on Shop Drawings or a weld map complete information regarding base metal specification designation, location, type, size, and extent of welds with reference called out for WPS and NDE numbers in tails of combined welding and NDE symbols as indicated in AWS A2.4.

b. Distinguish between shop and field welds.

c. Indicate, by welding symbols or sketches, details of welded joints and preparation of base metal. Provide complete joint welding details showing bevels, groove angles, and root openings for welds.

d. For pipe fittings, provide a joint weld beveling diagram. Refer to AWS D1.1, Annex G Local Dihedral Angle that can be used to calculate bevels for weld joint details of intersecting pipes.

e. Welding and NDE symbols shall be in accordance with AWS A2.4.

f. Welding terms and definitions shall be in accordance with AWS A3.0.

g. Submit welding data together with shop drawings as a complete package.

B. Informational Submittals:

1. WPQs.

2. CWI credentials.

3. Testing agency personnel credentials.

4. CWI reports.

5. Welding Documentation: Submit on appropriate forms in referenced welding codes.

1.04 QUALIFICATIONS

A. WPSs: In accordance with AWS D1.1 (Annex E Forms).

B. WPQs: In accordance with AWS D1.1 (Annex E Forms).

C. CWI: Certified in accordance with AWS QC 1, and having prior experience with the welding codes specified. Alternate welding inspector qualifications require approval by the Engineer.

D. Testing Agency: Personnel performing tests shall be NDT Level II certified in accordance with ASNT SNT-TC-1A.

1.05 SEQUENCING AND SCHEDULING

A. Unless otherwise specified, all Submittals required in this section shall be submitted and approved prior to commencement of welding operations.

PART 2 – PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. The CWI shall be present whenever shop welding is performed. The CWI shall perform inspection, as necessary, prior to assembly, during assembly, during welding, and after welding. CWI shall perform inspections as required in AWS D1.1 or referenced welding code and as follows:

1. Verifying conformance of specified job material and proper storage.

2. Monitoring conformance with approved WPS.

3. Monitoring conformance of WPQ.

4. Inspecting weld joint fit-up and in-process inspection.

5. Providing 100 percent visual inspection of welds.

6. Supervising nondestructive testing personnel and evaluating test results.

7. Maintaining records and preparing report confirming results of inspection and testing comply with the work.

PART 3 – EXECUTION

3.01 GENERAL

A. Welding and Fabrication by Welding: Conform to governing welding codes referenced in attached Welding and Nondestructive Testing Table.

B. Welding procedure specifications for all pressure piping shall be qualified for notch toughness by limiting heat input; charpy testing of weld metal and heat affected zone shall be done as a part of the welding procedure qualification. Full-size specimens shall be charpy tested in accordance with ASTM A370 at a test temperature of 30 degrees F. The minimum average energy of the test coupons shall not be less than 25 foot-pounds.

3.02 NONDESTRUCTIVE WELD TESTING REQUIREMENTS

A. Weld Inspection Criteria:

1. Selection of welds to be tested unless 100 percent NDT is specified herein, shall be as agreed upon between Contractor and Subcontractor.

2. Unless otherwise specified, perform NDT of welds at a frequency as shown below or in the attached table in accordance with the referenced welding codes as follows. In case there is a conflict the higher frequency level of NDT shall apply:

   a. Fillet Welds and PJP Groove Welds: 10 percent random MT or PT.

   b. All Welds: 100 percent VT.

3. Weld Acceptance:

   a. VT:

      1) Structural Pipe and Tubing: AWS *D1.1*, Paragraph 6.9, Visual Inspection, Tubular Connections.

      2) All Other Structural Steel: AWS D1.1, Paragraph 6.9, Visual Inspection, Statically Loaded Nontubular Connections.

      3) Stud Connections: AWS *D1.1*, Paragraph 7.8.1.

   b. PT or MT:

1) Perform on fillet and PJP groove welds in accordance with AWS *D1.1,* Paragraph 6.10.

2) Acceptance shall be in accordance with VT standards specified above.

3.03 FIELD QUALITY CONTROL

A. The CWI shall be present whenever field welding is performed. The CWI shall perform inspection, as necessary, prior to assembly, during assembly, during welding, and after welding. CWI shall perform inspections as required in AWS D1.1 or referenced welding code and as follows:

1. Verifying conformance of specified job material and proper storage.

2. Monitoring conformance with approved PS.

3. Monitoring conformance of WPQ.

4. Inspecting weld joint fit-up and in-process inspection.

5. Providing 100 percent visual inspection of all welds.

6. Supervising nondestructive testing personnel and evaluating test results.

7. Maintaining records and preparing report confirming results of inspection and testing comply with the Work.

3.04 WELD DEFECT REPAIR

A. Repair and retest rejectable weld defects until sound weld metal has been deposited in accordance with appropriate welding codes.

3.05 SUPPLEMENTS

A. The supplement listed below, following "End of Section," is a part of this Specification.

1. Welding and Nondestructive Testing table.

END OF SECTION

Welding and Nondestructive Testing						
Specification Section	**Governing Welding Codes or Standards**	**Submit WPS**	**Submit WPQ**	**Onsite CWI Req'd**	**Submit Written NDT Procedure Specifications**	**NDT Requirements**
05 12 00 Structural Steel Framing	AWS D1.1, Structural Welding Code – Steel	Yes	Yes	Yes	Yes	100% UT or RT of all CJP groove-and-butt joint welds; 10% MT of all fillet welds; see Section 05 12 00
05 31 00 Steel Decking	AWS D1.1, Structural Welding Code – Steel or AWS D1.3, Structural Welding Code – Sheet Steel	No	No	Yes	No	100% VT; see Section 05 31 00
05 41 00 Structural Metal Stud Framing	AWS D1.1, Structural Welding Code – Steel or AWS D1.3, Structural Welding Code – Sheet Steel	Yes	Yes	Yes	Yes	100% VT; see Section 05 41 00
05 50 00 Metal Fabrications	AWS D1.1, Structural Welding Code – Steel or AWS D1.2, , Structural Welding Code – Aluminum or AWS D1.6, Structural Welding Code – Stainless Steel	Yes	Yes	Yes	Yes	100% VT; see Section 05 50 00
05 51 00 Metal Stairs	AWS D1.1, Structural Welding Code – Steel or AWS D1.3, Structural Welding Code – Sheet Steel	Yes	Yes	Yes	Yes	100% VT; see Section 05 51 00
05 52 00 Metal Railings	AWS D1.1, Structural Welding Code – Steel or AWS D1.2, , Structural Welding Code – Aluminum	No	No	No	No	100% VT; see Section 05 52 00
05 53 00 Metal Gratings	AWS D1.1, Structural Welding Code – Steel or AWS D1.2, , Structural Welding Code – Aluminum	No	No	No	No	100% VT; see Section 05 53 00

INDEX TO

SECTION 05 12 00 – STRUCTURAL STEEL FRAMING

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 – GENERAL

1.01 REFERENCES

A. Provide the structural steel system, including shop primer or galvanizing, complete and ready for use. Structural steel systems including design, materials, installation, workmanship, fabrication, assembly, erection, inspection, quality control, and testing shall be provided in accordance with AISC 325 except as modified in this contract.

1.02 REFERENCES

A. The following is a list of standards (LATEST REVISION) which may be referenced in this section:

AISC 303	Code of Standard Practice for Steel Buildings and Bridges
AISC 316	ASD Manual of Steel Construction
AISC 317	ASD Manual of Steel Construction, Vol II: Connections
AISC 325	LRFD Manual of Steel Construction
AISC 326	Detailing for Steel Construction
AISC 348	Structural Joints Using ASTM A325 or A490 Bolts
AISC 350	Load and Resistance Factor Design (LRFD) Specification for Structural Steel Buildings
AISC M018L	LRFD Manual of Steel Construction, Metric Conversion Volume I
AISC M019L	LRFD Manual of Steel Construction, Metric Conversion Volume II

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS D1.1	Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A 123	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 325	Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 36	Carbon Structural Steel
ASTM A 490	Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
ASTM A 500	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

ASTM A 53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 563	Carbon and Alloy Steel Nuts
ASTM A 572	High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A 6	General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A 780	Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings
ASTM A 992	Structural Steel Shapes
ASTM F 436	Hardened Steel Washers
ASTM F 959	Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners

1.03 MODIFICATIONS TO REFERENCES

A. AISC 325, AISC 350, AISC 303, AISC 348, and AISC S340, except as modified in this section, shall be considered a part of AISC M018L and AISC M019L and is referred to in this section as AISC 325.

1.04 SUBMITTALS

A. Action Submittals:

1. Provide Shop Drawing details showing:

   a. Complete details and schedules for fabrication and shop assembly of members and details of cuts, connections, camber, holes and other pertinent data. Indicate welds by standard AWS symbols and show size, length, and type of each weld.

   b. Provide setting or erection Drawings for the installation of anchor bolts and other anchorages or embedded items to be installed by others.

   c. Schedules for fabrication procedures.

   d. Primer and other coatings.

   The Contractor shall check and stamp all submittals for conformance with these Specifications and with the Drawings before submission to the Engineer. In review of Shop Drawing, Engineer shall not be deemed to have conducted structural analyses or detailed review of standard details prepared under fabricator's design responsibility

2. Name and address of manufacturer(s).

3. Product specifications.

4. Manufacturers' testing procedures and standards.

5. Preparation and installation or application instructions, as appropriate.

B. Informational Submittals:

1. Mill Certificates of tests made in accordance with ASTM A6.

2. High–Strength Bolts (Plain Noncoated and Hot–Dip Galvanized):

a. Certificates of Compliance that products meet chemical and mechanical requirements of standards specified.

b. Manufacturer's inspection test report results for production lot(s) furnished, to include:

1) Tensile strength.

2) Yield strength.

3) Reduction of area.

4) Elongation and hardness.

c. Certified Mill Test Reports for Bolts and Nuts:

1) Name and address of manufacturer.

2) Bolts correctly marked.

3) Marked bolts and nuts used in required mill tests and manufacturer's inspection tests.

3. Direct Tension Indicators (DTIs): Furnish manufacturer's test report meeting requirements of ASTM F959.

4. Tension Control (TC) Bolts: Furnish manufacturer's test report meeting requirements of ASTM A325 and ASTM F1852.

5. Methods proposed to resolve misalignment between anchor bolts and bolt holes in steel members.

6. Welding Materials Procedures, Qualifications, and inspection Report: As specified in Section 05 05 23, Welding.

7. Non-shrink Grout

8. Hot–Dip Galvanizing: Certificate of compliance signed by galvanizer with description of material processed and ASTM standard used for coating.

9. AISC Quality Certification: AISC certificate showing name and address of certified firm, effective date, and category of certification; or, for erectors, documentation of similar project experience to include project name, location, date of completion, and name and phone number of owner's contact person.

1.05 QUALITY ASSURANCE

A. Drawing Requirements:

1. Fabricate structural steel members in accordance with AISC Code of Standard Practice.

2. Design connections not detailed on Drawings under direct supervision of a registered Professional Structural Engineer experienced in design of this Work and licensed in Georgia.

3. Submit fabrication drawings for approval prior to fabrication. Prepare in accordance with AISC 326, AISC 316 and AISC 317. Drawings shall not be reproductions of contract drawings. Include complete information for the fabrication and erection of the structure's components, including the location, type, and size of bolts, welds, member sizes and lengths, connection details, blocks, copes, and cuts. Use AWS A2.4 standard welding symbols.

B. Mill identification marks in accordance with ASTM A6.

C. AISC Quality Certification for Fabricator: Conventional Steel Structures (Sbd).

D. AISC Quality Certification as Certified Steel Erector (CSE), or documented experience in erection of at least five similar structural steel facilities over the past 10 years in lieu of AISC certification.

E. Welding Qualifications: As specified in Section 050523, Welding.

F. Galvanized Coating Applicator: Company specializing in hot-dip galvanizing after fabrication and following procedures of Quality Assurance Manual of the American Galvanizers Association.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Load structural members in such a manner that they will be transported and unloaded without damage to coatings and without being excessively stressed, deformed, or otherwise damaged.

B. Storage:

1. Protect structural steel members and packaged materials from corrosion and deterioration.

2. Store in dry area and not in direct contact with ground.

3. Protect fasteners from dirt and moisture. Do not remove lubricant from bolts and nuts.

C. Handle materials to avoid distortion or damage to members or supporting structures.

D. Shop fabrication shall be sequenced/scheduled so that delivery will expedite erection, will minimize field handling of materials, and will ensure uninterrupted progress of the work

PART 2 – PRODUCTS

2.01 MATERIALS

A. Channels, Angles and Plates: ASTM A36, unless indicated otherwise.

B. W –Shapes:

1. ASTM A992, Grade 50 unless indicated otherwise on Drawings.

C. Steel Pipe: ASTM A53, Type E or S, Grade B.

D. Round Hollow Structural Sections (HSS): ASTM A500, Grade B (Fy equals 42 ksi).

E. Square and Rectangular Hollow Structural Sections (HSS): ASTM A500, Grade B (Fy equals 46 ksi).

F. For hot–dip galvanized steel that is exposed to view and does not receive paint, limit the combined phosphorus and silicon content to 0.04 percent. For steels that require a minimum of 0.15 percent silicon (such as plates over 1.5 inches thick for A36 and A572 steels), limit the maximum silicon content to 0.21 percent and the phosphorous content to 0.03 percent.

2.02 FASTENERS

A. Anchor Bolts: As specified in Section 05 50 0, Metal Fabrications.

B. High–Strength Bolts: ASTM A325, bolt type I plain uncoated. Bolt length and thread length shall be as required for the connection type shown, with hardened washers as required.

C. Direct Tension Indicators (DTIs) or Load Indicator Washers:

1. ASTM F959, coating type to match bolt finish.

2. Type A325 or A490, to match bolt type.

3. Manufacturers and Products:

a. TurnaSure LLC, Langhorne, P A; TI's.
b. Applied Bolting Technology Products, Ludlow, VT; DTI's, regular or Squirter type.

D. Tension Control (TC) Bolts:

1. High–strength, ASTM A325 and ASTM F1852.

2. Manufacturers:

a. Lejeune Bolt Company, Bumsville, MN.

b. Nucor Fastener, Saint Joe, IN.

c. T.S. Bolts and Tools, Bristol Machine Co., Walnut, CA.

d. Haydon Bolts, Philadelphia, P A.

e. Vermont Fasteners Manufacturing, Swanton, VT.

E. Nuts: ASTM A563, type to match bolt type and finish.

F. Hardened Steel Flat and Beveled Washers: AS M F436, type to match bolt finish.

G. Welded Shear Studs: As specified in Section 05 00 00, Metal Fabrications.

2.03 ANCILLARY MATERIALS

A. Surface Preparation and Primer: As specified in Section 09 90 00, Painting and Coating.

B. Grout: As specified in Section 03 30 00 Cast-In-Place Concrete.

2.04 FABRICATION

A. General:

1. Fabricate as shown and in accordance with AISC Specification for Structural Steel Buildings and AISC Code of Standard Practice for Steel Buildings and Bridges.

2. Columns shall be full length members without splices, unless shown otherwise or approved by Engineer.

3. Mark and match materials for field assembly.

4. Complete assembly, including bolting and welding of units, before start of finishing operations.

5. Fabricate to agree with field measurements.

B. Connections:

1. Shop Connections: Weld or bolt, as shown.

2. Meet requirements of AISC Manual of Steel Construction tables for bolted double–angle shear connections, unless indicated otherwise.

3. Meet OSHA requirements for one independent bolt at beams framing in to column web connections.

4. Provide oversized holes for anchor bolts in column base plates in accordance with AISC Manual of Steel Construction, unless indicated otherwise.

C. Welded Construction:

1. As specified in Section 05 05 23, Welding.

2. Groove and Butt Joint Welds: as indicated. Where no size is provided, Engineer intends for minimum size for the prequalified weld to be used from AISC Manual of Steel Construction.

D. Interface with Other Work:

1. Holes:

a. As necessary or as indicated for securing other Work to structural steel framing, and for passage of other Work through steel framing members.
b. No flame–cut holes will be permitted without prior approval of Engineer.

2. Weld threaded nuts to framing, and other specialty items as shown to receive other Work.

E. Shop Paint Primer:

1. Surface Preparation and painting as specified in Section 09 90 00, Painting and Coating.

2. Do not shop prime the following surface, unless indicated otherwise:

a. Faying surfaces of slip critical bolt d connections.

b. Within 2 inches of field–welded connections.

c. Steel members to be completely encased in reinforced concrete or coated with cementitious fireproofing.

3. Apply shop primer to top flange surfaces of composite steel beams unless indicated otherwise.

F. Galvanizing:

1. Fabricate steel to be galvanized in accordance with ASTM A143, ASTM A384, and ASTM A385. Avoid fabrication techniques that could cause distortion or embrittlement of steel.

2. Remove welding slag, splatter, burrs, grease, oil, paint, lacquer, and other deleterious material prior to delivery for galvanizing.

3. Remove by blast cleaning or other methods surface contaminants and coatings not removable by normal chemical cleaning process in the galvanizing operation.

4. Hot–dip galvanize steel members, fabrications, and assemblies after fabrication in accordance with ASTM A 23.

5. Hot–dip galvanize ASTM A325 bolts, nuts, washers, and hardware components in accordance with ASTM 153. Oversize holes to allow for zinc alloy growth. Shop assemble bolts, nuts, and washers with special lubricant and test in accordance with ASTM A325 and ASTM A563.

6. Tension–control (TC) bolts, nuts, and washers shall be mechanically zinc coated in accordance with ASTM F1852 and ASTM B695, Class 50.

7. Galvanize components of bolted assemblies separately before assembly.

G. Slip Critical Bolted Connections:

1. Mask faying surfaces of slip critical (SC) bolted connections to be shop painted as specified in Section 09 90 00, Painting and Coating.

2. Roughen galvanized faying surfaces with hand wire brushing.

2.05 SOURCE QUALITY CONTROL

A. Welding:

1. Visually inspect fabrication welds in accordance with AWS D 1.1, Section 6 and Table 6.1, Visual Inspection Acceptance Criteria.

2. Repair and retest defective welds as specified in Section 05 05 23, Welding.

B. Hot–Dip Galvanizing:

1. An independent testing agency will be retained by Owner, if necessary.

2. Visually inspect and test for thickness and adhesion of zinc coating for minimum of three test samples from each lot in accordance with ASTM A123 and ASTM A153.

3. Reject and retest nonconforming articles in accordance with ASTM A123 and ASTM A153.

PART 3 – EXECUTION

3.01 ERECTION

A. Meet requirements of AISC Specification for Structural Steel Buildings and AISC Code of Standard Practice for Steel Buildings and Bridges, with exceptions as specified.

B. Install Contractor–designed temporary construction bracing to provide necessary support until components are in place and construction is complete.

C. High–Strength Bolted Connections:

1. Tighten in accordance with AISC Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts.

2. Hardened Washers:

a. Provide at locations required by Washer Requirements section of AISC Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts, to include slip critical connections using slotted or oversized holes or ASTM A490 bolts.

b. Use beveled style and extra thickness where required by AISC Specification.

c. Use square or rectangular beveled washers at inner flange surfaces of American Standard beams and channels.

d. Do not substitute DTIs for hardened flat washers required at slotted and oversize holes.

3. For bearing–type connections not fully tensioned (N, X), tighten to snug tight condition. Use hardened washer over slotted or oversize holes in outer plies.

D. Fully Tensioned Bolted Connections:

1. Use DTIs or TC bolts at slip critical (SC) and fully tensioned (FT) bearing–type connections.

2. DTIs:

a. Position within bolted assembly in accordance with ASTM F959.

b. Install bolts, with DTIs plus hardened washers as required, in all holes of an assembly and tighten until plies are in firm contact and fasteners are uniformly snug tight.

3. Final tighten bolts, beginning at most rigid part of bolted connection and progressing toward free edges, until final twist–off of TC bolts or until DTIs

have been compressed to an average gap equal to or less than shown in Table 2, ASTM F959.

E. Welded Connections:

1. As specified previously herein.

3.02 ANCHOR BOLTS

A. Coordinate installation of anchor bolts and other connectors required for securing structural steel to in–place work.

B. Provide templates and other devices for presetting bolts and other anchors to accurate locations.

C. Projection of anchor bolts beyond face of concrete and threaded length shall be adequate to allow for full engagement of all threads of hold–down nuts, adjustment of leveling nuts, washer thicknesses, and construction tolerances, unless indicated otherwise.

D. Placement Tolerances:

1. As required by AISC Code of Standard Practice for Steel Buildings and Bridges, unless indicated otherwise.

2. Embedded anchor bolts shall not vary from the dimensions as shown on Drawings by more than the following:

a. Center to center of any two bolts within an anchor group: 1/8 inch

b. Center to center of adjacent anchor bolt groups: 1/4 inch.

c. Variation from perpendicular to theoretical bearing surface: 1:50.

3.03 SETTING BASES AND BEARING PLATES

A. Clean concrete and masonry bearing surfaces of bond reducing materials and roughen to improve bond to surfaces.

B. Clean bottom surface of base and bearing plates.

C. Set loose and attached base plates and bearing plates for structural members on wedges, shims, leveling nuts, or other adjustable devices. Use leveling *plates* where indicated.

D. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to placing grout. Weld plate washers to base plates where indicated.

E. Grout Under Baseplates, prior to placing loads on structure.

1. Center to center of any two bolts within an anchor group: 1/8 inch.

2. Center to center of adjacent anchor bolt groups: 1/4 inch.

3. Variation from perpendicular to theoretical bearing surface: 1:50.

3.04 FIELD ASSEMBLY

A. Set structural frames accurately to lines and elevations shown.

B. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly.

C. Align and adjust various members forming a part of a complete frame or structure before permanently fastening.

D. Level and plumb individual members of structure within tolerances shown in AISC Code of Standard Practice for Steel Buildings and Bridges.

E. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be completed and in service.

F. Perform necessary adjustments to compensate for minor discrepancies in elevations and alignment.

G. Provide additional field connection material as required by AISC Code of Standard Practice for Steel Buildings and Bridges.

H. Splice members only where indicated and accepted on shop drawings.

3.05 MISFITS AT BOLTED CONNECTIONS

A. Where misfits in erection bolting are encountered, immediately notify Engineer for approval of one of the following: methods of correction:

1. Ream holes that must be enlarged to admit bolts and use oversized bolts.

2. Plug weld misaligned holes and redrill holes to admit standard size bolts.

3. Drill additional holes in connection, conforming to AISC Standards for bolt spacing and end and edge distances, and add additional bolts.

4. Reject member containing misfit, incorrect sized, or misaligned holes and fabricate new member to ensure proper fit.

B. Do not enlarge incorrectly sized or misaligned roles in members by burning or by use of drift pins.

3.06 MISFITS AT ANCHOR BOLTS

A. Resolve misalignments between anchor bolts and bolt holes in steel members in accordance with approved submittal.

B. Do not flame cut to enlarge holes without prior approval of Engineer.

3.07 GAS CUTTING

A. Do not use gas cutting torches in field for correcting fabrication errors in structural framing.

B. Secondary members not under stress and concealed in finished structure may be corrected by gas cutting torches, if approved by Engineer.

C. Finish flame–cut sections equivalent to sheared and punched appearance.

3.08 REPAIR AND CLEANING

A. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop primer.

B. Remove and grind smooth tack welds, fit–up–lugs, and weld runoff tabs.

C. Remove weld back–up bars and grind smooth where indicated on Drawings.

D. Apply touchup paint primer by brush or spray of same thickness and material as that used in shop application and as specified in Section 09 90 00, Painting and Coating.

3.09 REPAIR OF DAMAGED HOT–DIP GALVANIZED COATING

A. Conform to ASTM A 780.

B. For minor repairs at abraded areas, use sprayed zinc conforming to ASTM A780.

C. For flame cut or welded areas, use zinc–based solder, or zinc sticks, conforming to ASTM A780.

D. Use magnetic gauge to determine that thickness is equal to or greater than base galvanized coating.

3.10 FIELD QUALITY CONTROL

A. High–Strength Bolted Connections:

1. An independent testing agency will be retained by Owner to perform the following inspection and testing in accordance with the AISC Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts:

a. Marking identification and conformance to ASTM standards.

b. Alignment of bolt holes.

c. Placement, type, and thickness of hardened washers.

d. Tightening of bolts.

2. Bearing–Type Connections Not Fully Tensioned (N, X): Snug tight condition with plies of joint in firm contact.

3. Fully Tensioned (FT) Bearing and Slip Critical (SC) Connections:

a. Conduct preinstallation test.

b. Monitor installation and tightening of DTIs or TC bolts.

c. Monitor condition of faying surfaces for slip critical connections.

4. Preinstallation Test:

a. Conduct jobsite test prior to start of work using a bolt tension measuring device.

b. Select representative sample of not less than three bolts of each diameter, length, and grade.

c. Include DTIs and flat hardened washers as required to match actual connection assembly.

d. Conduct test in accordance with Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts.

5. Nondestructive Testing (NDT) Report: Prepare and submit a written NDT report identifying location of inspected bolted connections and summary of corrections as required to meet code acceptance criteria.

6. Defective Connections: Correct and reinspect defective and improperly tightened high–strength bolted connections. Retest fully tensioned bolts as necessary to demonstrate compliance of completed work.

B. Welded Connections:

1. Visually inspect field welds in accordance with AWS D 1.1, Section 6 and Table 6.1, Visual Inspection Acceptance Criteria.

2. Repair and retest defective welds as specified in Section 05 05 23, Welding.

END OF SECTION

INDEX TO

SECTION 05 31 00 – STEEL DECKING

SECTION 05 31 00

STEEL DECKING

PART 1 – GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Iron and Steel Institute (AISI): Specifications for the Design of Cold Formed Steel Structural Members.

2. American Welding Society (AWS): D1.3, Structural Welding Code Sheet Steel.

3. ASTM International (ASTM):

   a. A653, Standard Specification for Steel Sheet, Zinc–Coated (Galvanized) or Zinc–Iron Alloy–Coated (Galvannealed) by the Hot–Dip Process.

   b. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot–Dip Galvanized Coatings.

   c. A924, Standard Specification for General Requirements for Steel Sheet, Metallic–Coated by the Hot–Dip Process.

4. Steel Deck Institute (SDI):

   a. Design Manual for Composite Decks, Form Decks, and Roof Decks.

   b. Diaphragm Design Manual.

5. Factory Mutual (FM):

   a. Factory Mutual Approval Guide.

   b. FM Research Corporation (FMRC): Approval Requirements for Steel Roof Deck Construction.

6. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory.

1.02 SUBMITTALS

A. Action Submittals:

1. Plan view layout of decking showing type and section properties of deck panels, reinforcing channels, pans, special jointing, and accessories.

2. Location of openings, deck laps, and deck attachment details.

B. Informational Submittals:

1. Decking manufacturer's installation requirements.

2. Welding Procedures, Qualifications, and Inspection Report: As specified in Section 05 05 23, Welding.

3. Operation manuals for mechanical fastener installation tools.

4. Manufacturer's Certificate of Compliance to state product conformance with design requirements.

1.03 QUALITY ASSURANCE

A. General: For metal decking section properties, meet requirements of AISI Specifications for Design of Cold–Formed Steel Structural Members.

B. FM Requirements:

1. Steel Roof Deck: Listed in Factory Mutual "Approval Guide" for Class 1 fire rating and Class 1–120 wind uplift rating.

2. Mechanical Fasteners: Packing containers shall show name of manufacturer and product and FMRC approval mark.

C. Qualifications for Field Welding: As specified in Section 05 05 23, Welding.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store deck bundles on platforms or pallets, with one end elevated to provide drainage.

C. Protect bundles against condensation with a ventilated waterproof covering.

D. Stack bundles so there is no danger of tipping, sliding, rolling, shifting, or material damage.

PART 2 – PRODUCTS

2.01 METAL DECKING

A. Materials and Finishes:

1. Galvanized Deck:

a. Sheet steel for galvanized deck and accessories shall conform to ASTM A653 Structural Quality Grade 33 or higher.

b. Galvanizing shall conform to ASTM A924 with coating class of G90 as defined in ASTM A653.

B. Manufacturers:

1. Vulcraft Division of Nucor Co. Model 2VLI, 20 Gage.

2. Approved equal.

C. Welding Materials: AWS D1.1

2.02 ACCESSORIES

A. Provide pour stops, column closures, end closures, cover plates, girder fillers, ridge and valley plates, finish strips, reinforcing channels, and other accessories as required for complete installation.

B. Accessories shall be minimum 22–gauge, except edge forms shall be sized as required by the deck manufacturer, unless shown otherwise on the Drawings.

2.03 MECHANICAL FASTENERS

A. Self–Drilling Screws:

1. Galvanized, hardened, self–drilling, self–tapping screws with hexagonal washer head.

2. Manufacturers and Products:

a. ITW Buildex, Itasca, IL;

b. Hilti, Inc., Tulsa, OK;

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine supporting framing and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of steel deck.

3.02 INSTALLATION

A. Install deck panels and accessories according to Steel Deck Institute specifications and recommendations, SDI Manual of Construction with Steel Deck, and in accordance with the placement plans and requirements of this Section.

B. Locate deck bundles to prevent overloading of support framing members.

C. Install at right angles to supporting members in a three-span minimum lay–up, unless shown otherwise, and in accordance with Specification and manufacturer's installation recommendation.

D. Bearing: 1–1/2 inches, minimum.

E. Endlaps: Minimum of 2 inches and located over supports.

F. Do not stretch sidelaps.

G. Cut and neatly fit deck and accessories at skew conditions, around openings, and at other work projecting through or adjacent to the decking

H. Closure Plates:

1. Install closure and cover plate accessories as recommended by the metal deck manufacturer, unless shown otherwise on the Drawings.

2. Floor Deck and Form Deck Closures:

a. Fasten column closures, cell closures, and zee closures to deck to provide tight fitting closures at open ends of ribs and sides of decking.

b. Fasten cell closures at changes of direction of deck units unless otherwise indicated.

I. Holes and Openings

1. Do not cut unscheduled openings through the deck without the approval of the Engineer. Reinforce openings as directed.

2. Cut and fit around roof openings and other work projecting through or adjacent to decking.

3. Locate holes and openings to clear structural framing and bracing members.

4. Reinforcement around openings:

a. Roof Deck: For hole sizes of at least 6 inches across, but not more than 12 inches across in roof deck, reinforce with 0.0474–inch design thickness steel plate, painted, or galvanized to match deck coating. Extend plate at least 12 inches beyond opening in all directions and attach to top of roof deck with No. 10 self–drilling screws at 6–inch spacing and at all corners. For openings larger than 12 inches across, reinforce roof deck with framing as shown on Drawings.

J. Protect deck areas from heavy concentrated loads or wheel traffic with planking or other approved means. Do not impose construction loads that exceed the load capacity of the deck.

K. Install temporary shoring, if required, to meet strength and deflection limitations, before placing any concrete topping on deck panels.

L. Completed Deck: Free from buckles and irregularities, and in accordance with FM and UL requirements.

3.03 DECK ATTACHMENT

A. Fasten panels as shown in the following schedule:

Steel Deck Attachment Schedule							
		At Perpendicular Supports		At Parallel Supports		At Sidelaps	
Type	Depth (in)	Type	Spacing	Type	Spacing (in)	Type	Spacing
Floor Deck	2 + 4	5/8" dia. puddle welds	12" o.c.	5/8" dia. puddle welds	24" max	Weld per Mfr	24" max

B. Welded Connections: Weld deck sidelaps, attachment to framing, and accessories in accordance with AWS D1.3 and as specified in Section 05 05 23, Welding.

C. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating with two coats of cold galvanizing compound which imparts cathodic action against corrosion. Surface preparation and application shall be in accordance with the manufacturer's instructions.

D. Mechanical Fasteners:

1. Self–Drilling Screws:
   a. Install screws in accordance with manufacturer's written instructions and with special installation tool. Do not over–torque.

   b. Remove and redrive screws at sidelaps where upper sheet is not drawn tightly against lower sheet.

3.04 TOUCHUP PAINTING

A. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating with two coats of cold galvanizing compound which imparts cathodic action against corrosion. Surface preparation and application shall be in accordance with the manufacturer's instructions.

B. Immediately following erection, remove unused deck edge trimmings, screws, fasteners, welding washers, butt ends of welding rods, and debris from completed installation.

C. Clean field welds, bolted connections, rust spots, and abraded areas.

D. Repair any damaged galvanized surfaces with zinc–rich spray paint in accordance with ASTM A 780; color to match galvanized deck.

E. Use magnetic gauge to determine that thickness of repair is equal to or greater than base painted or galvanized coating.

3.05 FIELD QUALITY CONTROL

A. An independent testing agency will be retained by Owner to perform following inspections.

1. Welded Connections: Visually inspect in accordance with AWS D1.3, Section 7, and as specified in Section 05 05 23, Welding.

2. Mechanical Fasteners: Visually inspect, in accordance with manufacturer's instructions, for each type of fastener.

B. Repair or replace defective welds and fasteners.

END OF SECTION

INDEX TO

SECTION 05 41 00 – COLD-FORMED STEEL FRAMING

SECTION 05 41 00

COLD-FORMED STEEL FRAMING

PART 1 – GENERAL

1.01 SUMMARY

1. This section applies to cold-formed metal trusses.

2. Relevant specification sections include 09 22 16, Non-Structural Metal Framing, applicable to interior non-loadbearing metal stud wall framing.

1.02 SUBMITTALS

A. Product Data: Truss Component Manufacturer's material certifications and descriptive literature for each item of cold-formed metal framing and each accessory specified in this section.

B. Shop Drawings: Truss fabricator's drawings and details that indicate the following:

1. special components and installations not fully detailed in product data
2. the number, types, location, and spacings of trusses and other framing members
3. details of truss loading, reactions, uplifts, support locations, material sizes and gauges, permanent truss web bracing, and splices as required for a complete installation

C. Truss Component Manufacturer's Instructions: Printed installation instructions for each item of cold-formed metal framing and each accessory specified in this section.

D. Design Data: Results of design analysis, bearing the seal and signature of a professional engineer registered in the State in which project is located.

E. Welding Procedures, Qualifications, and Inspection Report: As specified in Section 05 05 23, Welding.

1.03 QUALITY ASSURANCE

A. General: For member section properties, meet requirements of AISI, Specification for the Design of Cold–Formed Steel Structural Members and Design Guide for Cold–Formed Steel Trusses.

B. Qualifications for Welding: As specified in Section 05 05 23, Welding.

C. Pre-installation Meeting: to be held on site prior to commencement of construction activities of this section to include installer(s) of products in this section, general contractor, engineer.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Handle and lift shop assembled units in accordance with Truss Component Manufacturer's recommendations to prevent damage or distortion.

B. Deliver to Site in bundles marked with name of manufacturer, section type, thickness, grade of material, and length.

C. Store bundles on wood blocking, flat and off ground, to keep clean and to prevent any damage or permanent distortion. Adhere to other recommendations from Truss Component Manufacturer to prevent damage, distortion and moisture buildup.

1.05 DESIGN REQUIREMENTS

A. Design loads shall be as indicated on the drawings.

B. Design framing systems to withstand design loads without vertical deflections greater than 1/240 of the span.

C. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 degrees F.

D. Design framing systems to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.

PART 2 – PRODUCTS

2.01 GENERAL

A. Truss system, with framing components and accessories, shall provide a complete horizontal framing system, ready for deck installation, meeting specified Design Requirements.

B. Dimensions and Properties: Calculate section properties in accordance with AISI Cold–Formed Steel Design Manual.

2.02 MANUFACTURERS

A. Choose from the following:

1. Aegis Metal Framing (MiTek USA Inc.).

2. Advanced Exterior Systems.

3. TrusSteel (ITW Building Components Group).

4. Nuconsteel (A Nucor Company)

5. Raney Truss

6. East Coast Truss, Inc.

7. Other approved suppliers may be considered upon request, prior to submittal of bids and contract award.

2.03 MATERIALS

A. Truss chord and web components shall have rolled or closed edges.

B. Load Bearing Members: Mechanical properties of components shall be determined by testing conforming to ASTMA 370 - Standard Test Methods and Definitions for Mechanical Testing of Steel Products. Members shall be cold-formed to indicated sizes, profiles, and thickness of steel conforming to ASTMA 653, minimum G60 coating, and ASTM A500 as follows:

1. Chord materials - Minimum yield strength 55,000 KSI
2. Web materials - Minimum yield strength 45,000 KSI.
3. Shapes: Indicated on shop drawings.
4. Size: Indicated on shop drawings.
5. Gauge: Indicated on shop drawings.

C. Fasteners Used in Fabricating Trusses: All web to chord connections shall be made with the appropriate screw fastener as recommended by the Truss Component Manufacturer. Each screw shall bear the stamp of the Truss Component Manufacturer for ready identification. Alternative fastening methods, such as welding, are not acceptable.

D. Accessories shall be from same manufacturer as trusses.

2.04 MECHANICAL FASTENERS

A. Self–Drilling Screws:

1. Self–drilling, self–tapping screws with hexagonal washer head and corrosion–resistant finish.

2. Manufacturers and Products:

a. ITW Buildex, Itasca, IL; ICH Traxx Self–Drilling Fasteners with Climaseal Coating and Autotraxx Standup Installation Tool.

b. Hilti, Inc., Tulsa, OK; Kwik–Pro RWH Self–Drilling Screws with Kwik–Cote Treatment and Kwik–Tapper Screwdriver.

B. Powder–Driven Fasteners:

1. Knurled shank, minimum l/2–inch diameter steel washer, corrosion–resistant coating.

2. Pin diameter and length to suit deck type and flange thickness of steel support member.

3. Manufacturers and Products:

   a. ITW Buildex, Itasca, IL; Buildex BXI4 pins with yellow dichromate galvanizing and BX900 Installation Tool.

   b. Hilti, Inc., Tulsa, OK; ENP–series fasteners with electroplated zinc coating and DX–750 Installation Tool.

2.05 FABRICATION

A. Shop fabricate from cold formed steel components in accordance with shop drawings, using jigging systems to ensure consistent component placement and alignment of components, and to maintain specified tolerances as shown herein.

B. Field fabrication of trusses is strictly prohibited unless performed by authorized fabricator using the fabricator's shop assemblers and proper jigging systems. Request for this must be sent to Engineer with fabricator documentation.

C. Shop fabrication of other cold formed steel framing components into assemblies prior to erection is permitted; fabricate assemblies in accordance with shop drawings.

2.06 TOLERANCES

A. Material Tolerances: Steel for cold-formed chord components:

1. Nominal 22 ga. members: Minimum bare metal thickness: 0.0284 inch, Maximum design thickness: 0.0299 inch.
2. Nominal 20 ga. members: Minimum bare metal thickness: 0.0329 inch, Maximum design thickness: 0.0346 inch.
3. Nominal 18 ga. members: Minimum bare metal thickness: 0.0428 inch, Maximum design thickness: 0.0451 inch.
4. Nominal 16 ga. members: Minimum bare metal thickness: 0.0538 inch, Maximum design thickness: 0.0566 inch.

B. Material Tolerances: Steel for cold-formed web components

1. Nominal 20 ga. members: Minimum bare metal thickness: 0.033 inch, Maximum design thickness: 0.035 inch.
2. Nominal 18 ga. members: Minimum bare metal thickness: 0.047 inch, Maximum design thickness: 0.049 inch.
3. Nominal 16 ga. members: Minimum bare metal thickness: 0.063 inch, Maximum design thickness: 0.065 inch.

C. Materials Tolerances: Truss Assemblies: Fabricate to tolerances of maximum variation from plumb, level, or true to line as indicated below:

1. Trusses up to 30 ft long = max 1/2 in. variation from design length.
2. Trusses over 30 ft. long = max 3/4 in. variation from design length.
3. Trusses up to 5 ft. high = max 1/4 in. variation from design height.
4. Trusses over 5 ft. high = max 1/2 in. variation from design height.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Inspect all fabricated assemblies and repair any damage.

B. Examine bearing support surfaces for compliance with requirements for installation tolerances and other conditions affecting performance of metal framing systems.

C. Provide smooth level bearing surfaces.

D. Clean all member and bearing surfaces that will be in contact after assembly.

3.02 INSTALLATION

A. General:

1. Install framing systems as indicated on Drawings, complete and in accordance with manufacturer's recommendations.

2. Provide temporary bracing for support of all construction loads until framing system is installed complete with sheathing or decking.

3. Install framing in true line, plumb, level, and in proper alignment.

4. Cut ends of framing members with saw or shear to bear uniformly against abutting members. Flame cutting is not permitted.

5. All structural framing members shall be full-length without splices, unless indicated otherwise.

6. Fasten members together in accordance with AISI, Cold-Formed Steel Design Manual, Part N, Connections. Wire tying is not permitted.

B. Metal Trusses:

1. Install metal trusses in accordance with Truss Component Manufacturer's instructions and the Truss Fabricator's shop drawing submittal. Place components at spacings indicated on the Truss Fabricator's shop drawings. Install truss installation (erection) bracing. Truss installation (erection) bracing shall hold trusses straight and plumb and in safe

condition until decking and permanent truss bracing has been fastened, forming a structurally sound framing system. All sub-contractors shall employ proper construction procedures to insure adequate distribution of temporary construction loads so that the carrying capacity of any single truss or group of trusses is not exceeded.

2. Install required roof and system permanent bracing and bridging as indicated by the drawings and notes of the Architect or Engineer. See the Truss Fabricator's shop drawings for any additional bracing requirements. All truss installation (erection) bracing and permanent bracing and bridging shall be installed before the application of any loads.

3. The field removal, cutting or alteration of any truss chord, web or bracing members is not allowed without prior written approval of the Engineer and the Truss Designer.

4. Damaged chords, webs and complete trusses shall be repaired or replaced as directed and approved in writing by the Engineer and the Truss Designer prior to installation or application of the repair or replacement.

5. Install field fasteners as identified on drawings and in accordance with Manufacturer's recommendations.

6. Tolerances:

   a. Variation from Level or Specified Plane: Maximum 1/8 inch in 10 feet.

   b. Variation from Specified Position: Maximum 1/4 inch.

3.03 FIELD QUALITY CONTROL

A. An independent testing agency will be retained by Owner to inspect field connections and welds.

   1. Mechanical Fasteners: Visually inspect in accordance with manufacturer's instructions, for each type of fastener.

   2. Welded connections performed during fabrication shall be visually inspected.

B. Repair or replace defective welds and/or fasteners.

END OF SECTION

INDEX TO

SECTION 05 50 00 – METAL FABRICATIONS

SECTION 05 50 00

METAL FABRICATIONS

PART 1- GENERAL

1.01 CLASSIFICATION OF ENVIRONMENTS

A. See Paragraph 1.03 of Section 01 00 01, General Requirements for additional information.

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:

a. Metal fabrications, including welding and fastener information.
b. Specific instructions for concrete anchor installation, including drilled hole size, preparation, placement, procedures, and instructions for safe handling of anchoring systems.

2. Samples: Color samples of abrasive stair nosings.

B. Informational Submittals:

1. Concrete and Masonry Drilled Anchors:
2.

a. Manufacturer's product description and installation procedures.
b. Current test data or ICC Evaluation Report.
c. Adhesive Anchor Installer Certification.

3. U–Channel Concrete Inserts:
4.

a. Manufacturer's product description.
b. Allowable load tables.

3. Ladders: Certification of load and fatigue tests.

4. Passivation method for stainless steel members.

5. Hot–Dip Galvanizing: Certificate of compliance signed by galvanizer, with description of material processed and ASTM standard used for coating.

1.03 QUALITY ASSURANCE

A. Qualifications:

I. Adhesive Anchor Installers: Trained and certified by manufacturer.

2. Galvanized Coating Applicator: Company specializing in hot–dip galvanizing after fabrication and following procedures of Quality Assurance Manual of the American Galvanizers Association.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Insofar as practical, factory assemble items specified herein. Assemblies that due to necessity have to be shipped unassembled shall be packaged and tagged in manner that will protect materials from damage and will facilitate identification and field assembly.

B. Package stainless steel items in a manner to provide protection from carbon impregnation.

C. Protect painted coatings and hot–dip galvanized finishes from damage due to metal banding and rough handling. Use padded slings and straps.

D. Store fabricated items in dry area, not in direct contact with ground.

1.05 GUARANTEE–OWNER AS BENEFICIARY

A. Provide manufacturer's guarantee or warranty, with Owner named as beneficiary, in writing. Guarantee shall provide for correction of Work specified in this Section found defective during period of 2 years after date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work as specified in General Conditions.

1.06 EXTRA MATERIALS

A. Furnish, tag, and box for shipment and storage the following extra materials:

Item	Quantity
Neoprene Gasket	Two for each location requiring neoprene gaskets.
Four–inch wide by 50–foot long neoprene gasket material	One roll for each location requiring neoprene gaskets.
Neoprene Gasket Adhesive each	One (manufacturer's recommended) for location requiring neoprene gaskets.

B. Delivery: In accordance with Section 01 00 01, General Requirements.

PART 2 - PRODUCTS

2.01 GENERAL

A. For hot-dip galvanized steel that is exposed to view and does not receive paint, limit the combined phosphorus and silicon content to 0.04 percent. For steels that require a minimum of 0.15 percent silicon (such as plates over 1.5 inches thick for A36 steel), limit the maximum silicon content to 0.21 percent and the phosphorous content to 0.03 percent.

B. Unless otherwise indicated, meet the following requirements:

Item	ASTM Reference
Stainless Steel: Bars and Angles	A276, AISI Type 304 or 316 (304L or 316L for welded connections)
Shapes	A276, AISI Type 304 or 316 (304L or 316L for welded connections)
Steel Sheet, and Strip	A240/A240M, AISI Type 304 or 316 (304L or 316L for welded connections)
Bolts, Threaded Rods, Anchor Bolts, and Studs	F593, AISI Type 304 or 316, Condition CW
Nuts	F594, AISI Type 304 or 316, Condition CW
Steel Bolts and Nuts:	
Carbon Steel	A307 bolts, with A563 nuts
High-Strength	A325, Type 1 bolts, with A563 nuts
Anchor Bolts and Rods	FI554, Grade 55, with weldability supplement S 1.
Eyebolts	A489
Threaded Rods	A36/A36M
Flat Washers (Unhardened)	F844

Flat and Beveled Washers (Hardened)	F436
Thrust Ties for Steel Pipe: Threaded Rods	AI93/AI93M, Grade B7
Nuts	AI94/AI94M, Grade 2H
Plate	A283/A283M, Grade 2D
Welded Anchor Studs	A108, Grades C–1010 through C–1020
Aluminum Plates and Structural Shapes	B209 and B308/B308M, Alloy 6061–T6
Aluminum Bolts and Nuts	F468, Alloy 2024–T4
Cast Iron	A48, Class 35

C. Bolts, Washers, and Nuts: Use stainless steel, hot–dip galvanized steel, zinc–plated steel, and aluminum material types as indicated in Fastener Schedule at end of this section.

2.02 ANCHOR BOLTS AND ANCHOR BOLT SLEEVES

A. Cast–In–Place Anchor Bolts:

1. Headed type, unless otherwise shown on Drawings.
2. Material type and protective coating as shown in Fastener Schedule at end of this section.

B. Anchor Bolt Sleeves:

1. Plastic:
   a. Single unit construction with corrugated sleeve.
   b. Top of sleeve shall be self–threading to provide adjustment of threaded anchor bolt projection.
   c. Material: High density polyethylene.
   d. Manufacturer: Sinco Products, Inc., Middletown, CT, (800) 243–6753.
2. Fabricated Steel: ASTM A36/A36M.

2.03 CONCRETE AND MASONRY DRILLED ANCHORS

A. General:

1. AISI Type 304 or 316 stainless, hot–dip galvanized, or zinc–plated steel, as shown in Fastener Schedule at end of this section.

2. Current evaluation and acceptance reports by ICC or other similar code organization.

B. Wedge Anchors:

1. Manufacturers and Products:

a. ITW Ramset/Red Head, Addison, JL; Trubolt Wedge Anchor.
b. Hilti, Inc., Tulsa, OK; Kwik–Bolt–3 (KB–3) Anchor.
c. Powers Fasteners, New Rochelle, NY; Power–Stud Anchor.
d. Simpson Strong–Tie Co., Inc., Pleasanton, CA; Wedge–All Anchor.
e. Wej–It Corp., Tulsa, OK; ANKR–tite Wedge Anchor.
f. Adhesives Technology, Pompano Beach, FL; Kingpin Wedge Anchor.
g. Unitex, Kansas City, MO; Pro–Poxy 300 and Pro–Poxy 300 Fast Epoxy Adhesive Anchors.

C. Expansion Anchors:

1. Self–drilling anchors, snap–off or flush type, zinc–plated.
2. Non–drilling Anchors: Flush type for use with zinc–plated or stainless steel bolt, or stud type with projecting threaded stud.
3. Manufacturers and Products:

a. ITW Ramset/Red Head, Addison, JL; Multi–Set II Drop–In and Self Drill Anchor.
b. Hilti, Inc., Tulsa, OK; Hilti HDI Drop–In Anchor.
c. Powers Fasteners, New Rochelle, NY; Steel Drop–In Anchor.
d. Simpson Strong–Tie Co., Inc., Pleasanton, CA; Drop–In Anchor.

D. Undercut Anchors:

1. Manufacturers and Products:
a. USP Structural Connectors; DUC Undercut Anchor.
b. Hilti, Inc., Tulsa OK; HDA Undercut Anchor.

E. Sleeve Anchors:

1. Manufacturers and Products:
a. ITW Ramset/Red Head, Addospm. Il,; Dyanbolt Hex Nut Sleeve Anchor.
b. Powers Fasteners, New Rochelle NY; Hex Head Power–Bolt Anchor.
c. Simpson Strong–Tie Co., Inc., Pleasantion, CA; Sleeve–All Hex Head Anchor.
d. Wej–It Corp., Tulsa, OK; Wej–It Sleeve Anchor.
e. Hilti, Inc., Tulsa, OK; HSL–3 Heavy Duty Sleeve Anchor.

F. Adhesive Anchors:

1. Threaded Rod:

a. ASTM F593 stainless steel threaded rod, diameter as shown on Drawings.
b. Length as required, to provide minimum depth of embedment.
c. Clean and free of grease, oil, or other deleterious material.
d. For hollow–unit masonry, provide galvanized or stainless steel wire cloth screen tube to fit threaded rod.

2. Adhesive:

a. Two–component, designed to be used in adverse freeze/thaw environments, with gray color after mixing.
b. Cure Temperature, Pot Life, and Workability: Compatible for intended use and environmental conditions.
c. Nonsag, with selected viscosity base on installation temperature and overhead application where applicable.
d. Adhesive anchoring system shall be certified to meet AC308.

3. Packaging and Storage:

a. Disposable, self–contained cartridge system capable of dispensing both components in the proper mixing ratio and fitting into a manually or pneumatically operated caulking gun.
b. Store adhesive cartridges on pallets or shelving in covered storage area, in accordance with manufacturer's written instructions.
c. Cartridge Markings: Include manufacturer's name, product name, material type, batch or serial number, and adhesive expiration date.
d. Dispose of cartridges if shelf life has expired.

4. Manufacturers and Products:

e. Hilti, Inc., Tulsa, OK; HIT RE 500, HIT HY 20 and HY 200.

G. Adhesive Threaded Inserts:

1. Stainless steel, internally threaded insert.
2. Manufacturer and Product: Hilti, Inc., Tulsa, OK; HIS–R Insert with HIT HY 200 adhesive.

2.04 WELDED ANCHOR STUDS

A. Headed anchor studs (HAS), threaded anchor studs (TAS), or deformed bar anchors (DBA), as indicated on Drawings.

1. Carbon Steel: ASTM A108, Standard Quality Grades 1010 through 1020, inclusive either semi–killed or killed aluminum or silicon dioxidation, unless indicated otherwise.

B. Manufacturers:

1. Nelson Stud Welding, FabriSteel Co., Elyria, OH.

2. Stud Welding Associates, Inc., Elyria, OH.

2.05 PIPE SLEEVES

A. As specified in Division 40 Specifications.

2.06 STEEL LINTELS AND SHELF ANGLES

A. In accordance with shapes and designations shown in Section 05 12 00 Structural Steel Framing.

2.07 ALUMINUM SUPPORT FRAMES FOR FLOOR PLATE AND GRATING

A. Aluminum support frames and connections to be installed in concrete shall be designed and provided by the fabricator.

B. Protective coatings shall be applied to aluminum components as required by the fabricator.

2.08 FABRICATED UNITS

A. Valve Operator Access Box: Cast iron, 8 inches by 4 inches, as manufactured by Zurn; No. ZN–1930–K.

B. Wire Mesh Screen:

1. Fabricate frame of aluminum shapes and flat bar stock.
2. Wire Mesh: Woven of 14–gauge aluminum wire, three openings per inch, stretched taut over frame before bolts are tightened down.

2.09 CASTINGS

A. Meter Box Manhole: Nonslip surface and handle, as manufactured by Olympic Foundry Co.; 5823B.

B. Floor Boxes:

1. Cast iron, except as otherwise shown.
2. Depth: Equal to slab thickness where installed.
3. Diameter: As shown.
4. Manufacturers and Products:

a. Neenah Foundry, Neenah, WI; R 7506.
b. Mueller, Decatur, IL; No. A–27010.
c. Olympic Foundry Co., Seattle, W A; No. 5680.

2.10 ACCESSORIES

A. Anti–seizing Lubricant for Stainless Steel Threaded Connections:

1. Suitable for potable water supply.

2. Resists washout.
3. Manufacturers and Products:

   a. Bostik, Middleton, MA; Neverseez.
   b. Saf–T–Eze Div., STL Corp., Lombard, IL; Anti–Seize.

B. Neoprene Gasket:

1. ASTM D1056, 2C1, soft, closed–cell neoprene gasket material, suitable for exposure to sewage and sewage gases, unless otherwise shown on Drawings.
2. Thickness: Minimum *1/4* inch.
3. Furnish without skin coat.
4. Manufacturer and Product: Rubatex Corporation, Bedford, V A; Rubatex No. *RA11–N.*

2.11 FABRICATION

A. General:

1. Finish exposed surfaces smooth, sharp, and to well–defined lines.
2. Furnish necessary rabbets, lugs, and brackets so work can be assembled in neat, substantial manner.
3. Conceal fastenings where practical; where exposed, flush countersink.
4. Drill metalwork and countersink holes as required for attaching hardware or other materials.
5. Grind cut edges smooth and straight. Round sharp edges to small uniform radius. Grind burrs, jagged edges, and surface defects smooth.
6. Fit and assemble in largest practical sections for delivery to Site.

B. Materials:

1. Use steel shapes, unless otherwise noted.
2. Steel to be hot–dip galvanized: Limit silicon content to less than 0.04 percent or to between 0.15 and 0.25 percent.
3. Fabricate aluminum in accordance with AA Specifications for Aluminum Structures –Allowable Stress Design.

C. Welding:

1. Weld connections and grind exposed welds smooth. When required to be watertight, make welds continuous.
2. Welded fabrications shall be free from twisting or distortion caused by improper welding techniques.
3. Steel: Meet fabrication requirements of AWS Dl.l, Section 5.
4. Aluminum: Meet requirements of AWS D 1.2.
5. Stainless Steel: Meet requirements of AWS D1.6.
6. Welded Anchor Studs: Prepare surface to be welded and weld with stud welding gun in accordance with AWS D 1.1, Section 7, and manufacturer's instructions.
7. Complete welding before applying finish.

D. Painting:

1. Shop prime with rust-inhibitive primer as specified in Section 09 90 00, Painting and Coating, unless otherwise indicated.
2. Coat surfaces of galvanized steel and aluminum fabricated items to be in direct contact with concrete, grout, masonry, or dissimilar metals, as specified in Section 09 90 00, Painting and Coating, unless indicated otherwise.
3. Do not apply protective coating to galvanized steel anchor bolts or galvanized steel welded anchor studs, unless indicated otherwise.

E. Galvanizing:

1. Fabricate steel to be galvanized in accordance with ASTM A143, ASTM A384, and ASTM A385. Avoid fabrication techniques that could cause distortion or embrittlement of the steel.
2. Provide venting and drain holes for tubular members and fabricated assemblies in accordance with ASTM A385.
3. Remove welding slag, splatter, burrs, grease, oil, paint, lacquer, and other deleterious material prior to delivery for galvanizing.
4. Remove by blast cleaning or other methods surface contaminants and coatings not removable by normal chemical cleaning process in the galvanizing operation.
5. Hot-dip galvanize steel members, fabrications, and assemblies after fabrication in accordance with ASTM AI23/A123M.
6. Hot-dip galvanize bolts, nuts, washers, and hardware components in accordance with ASTM AI53/A153M. Oversize holes to allow for zinc alloy growth. Shop assemble bolts and nuts.
7. Galvanized steel sheets in accordance with ASTM A653.
8. Galvanize components of bolted assemblies separately before assembly. Galvanizing of tapped holes is not required.

F. Watertight Seal: Where required or shown, furnish neoprene gasket of a type that is satisfactory for use in contact with sewage. Cover full bearing surfaces.

G. Fitting: Where movement of fabrications is required or shown, cut, fit, and align items for smooth operation. Make corners square and opposite sides parallel.

H. Accessories: Furnish as required for a complete installation. Fasten by welding or with stainless steel bolts or screws.

2.12 SOURCE QUALITY CONTROL

A. Visually inspect all fabrication welds and correct any deficiencies.

1. Steel: AWS D 1.1, Section 6 and Table 6.1, Visual Inspection Acceptance Criteria.
2. Aluminum: AWS D 1.2.
3. Stainless Steel: AWS D1.6.

B. Hot-Dip Galvanizing:

1. Visually inspect and test for thickness and adhesion of zinc coating for minimum of three test samples from each lot in accordance with ASTM A123/A123M and ASTM AI53/A153M.
2. Reject and retest nonconforming articles in accordance with ASTM A123/A123M and ASTM AI53/A153M.

PART 3 - EXECUTION

3.01 INSTALLATION OF METAL FABRICATIONS

A. General:

1. Install metal fabrications plumb or level, accurately fitted, free from distortion or defects.
2. Install rigid, substantial, and neat in appearance.
3. Install manufactured products in accordance with manufacturer's recommendations.
4. Obtain Contractor approval prior to field cutting steel members or making adjustments not scheduled.

B. Aluminum:

1. Do not remove mill markings from concealed surfaces.
2. Remove inked or painted identification marks on exposed surfaces not otherwise coated after installed material has been inspected and approved.
3. Fabrication, mechanical connections, and welded construction shall be in accordance with the AA Aluminum Design Manual.

C. Pipe Sleeves:

1. Provide where pipes pass through concrete or masonry.
2. Holes drilled with a rotary drill may be provided in lieu of sleeves in existing walls.
3. Provide a center flange for water stoppage on sleeves in exterior or water–bearing walls.
4. Provide a rubber caulking sealant or a modular mechanical unit to form a watertight seal in the annular space between pipes and sleeves.

D. Steel Lintels and Shelf Angles: Provide as required for support of masonry and other construction not attached to structural steel framing, unless otherwise shown on Drawings.

3.02 CAST–IN–PLACE ANCHOR BOLTS

A. Accurately locate and hold anchor bolts in place with templates at the time concrete is placed.

B. Use anchor bolt sleeves for location adjustment and provide two nuts and one washer per bolt of same material as bolt.

C. Minimum Bolt Size: I/2–inch diameter by 12 inches long, unless otherwise

shown.

3.03 CONCRETE AND MASONRY DRILLED ANCHORS

A. Begin installation only after concrete or masonry to receive anchors has attained design strength.

B. Install in accordance with manufacturer's instructions.

C. Provide minimum embedment, edge distance, and spacing as indicated on the Drawings.

D. Use only drill type and bit type and diameter recommended by anchor manufacturer. Clean hole of debris and dust with brush and compressed air.

E. For undercut anchors, use special undercutting drill bit and rotary hammer drill and apply final torque as recommended by anchor manufacturer.

F. When embedded steel or rebar is encountered in the drill path, slant drill to clear obstruction. If drill must be slanted more than 10 degrees to clear obstruction, notify Contractor for direction on how to proceed.

G. Adhesive Anchors:

1. Do not install adhesive anchors when temperature of concrete is below 40 degrees F or above 100 degrees F.
2. Remove any standing water from hole with oil-free compressed air. Inside surface of hole shall be dry where required by manufacturer's instructions.
3. For hollow-unit masonry, install screen tube in accordance with manufacturer's instructions.
4. Do not disturb anchor during recommended curing time.
5. Do not exceed maximum torque as specified in manufacturer's instructions.

3.04 U-CHANNEL CONCRETE INSERTS

A. Provide as indicated for pipe supports and where otherwise shown on Drawings.

B. Except for interior dry areas, use plastic clips or similar dielectric material to isolate channel anchors from concrete reinforcing steel.

3.05 ELECTROLYTIC PROTECTION

A. Aluminum and Galvanized Steel:

1. Coat surfaces of aluminum fabricated items to be in direct contact with concrete, grout, masonry, or dissimilar metals, as specified by fabricator/manufacturer.
2. Do not apply protective coating to galvanized steel anchor bolts or galvanized steel welded anchor studs, unless indicated otherwise.

3. Allow coating to dry before installation of the material.
4. Protect coated surfaces during installation.
5. Should coating become marred, prepare and touch up in accordance with paint manufacturer's written instructions.

B. Titanium: Where titanium equipment is in contact with concrete or dissimilar metal, provide full–face neoprene insulation gasket, 3/32–inch minimum thickness and 70–durometer hardness.

C. Stainless Steel:

1. During handling and installation, take necessary precautions to prevent carbon impregnation of stainless steel members.
2. After installation, visually inspect stainless steel surfaces for evidence of iron rust, oil, paint, and other forms of contamination.
3. Remove contamination in accordance with requirements of ASTM A380 and ASTM A967.
4. Brushes used to remove foreign substances shall utilize only stainless steel or nonmetallic bristles.
5. After treatment, visually inspect surfaces for compliance.

3.06 PAINTING AND REPAIR OF GALVANIZED STEEL

A. Painted Galvanized Surfaces: Prepare as specified in Section 09 90 00, Painting and Coating.

B. Repair of Damaged Hot–Dip Galvanized Coating:

1. Conform to ASTM A 780.
2. For minor repairs at abraded areas, use sprayed zinc conforming to ASTM A780.
3. For flame cut or welded areas, use zinc–based solder, or zinc sticks, conforming to ASTM A780.
4. Use magnetic gauge to determine that thickness is equal to or greater than the base galvanized coating.

3.07 FIELD QUALITY CONTROL

A. Welded Anchor Studs:

1. At start of each production period, Subcontractor shall perform the following test to determine proper generator, control unit, and stud welding gun settings, in accordance with AWS D 1.1, Chapter 7:

a. Weld two test studs and visually inspect for full 360–degree flash.
b. Bend test studs 30 degrees from vertical for headed anchor studs (HAS). Torque test threaded anchor studs (TAS) studs per AWS D1.1, Section 7.6.6.2.
c. Test studs will be acceptable if there is no failure of welds.
d. If weld fails, repeat test until two consecutive test studs test to be satisfactory.

2. During production, if visual inspection reveals that weld does not exhibit full 360-degree flash or that stud has been repaired by welding, Subcontractor shall perform the following test in accordance with AWS D1.1, Chapter 7:

   a. HAS studs, bend stud approximately 15 degrees from vertical, away from missing portion of flash. For TAS studs, torque test per AWS D1.1, Section 7.6.6.2.
   b. Studs meeting this test without exhibiting cracks in weld will be considered acceptable and left in bent position.
   c. Replace studs failing test.

3.08 MANUFACTURER'S SERVICES

A. Adhesive Anchors: Conduct site training of installation personnel for proper installation, handling, and storage of adhesive anchor system. Notify Contractor of time and place for sessions.

3.09 FASTENER SCHEDULE

A. Unless indicated otherwise on the Drawings, provide fasteners as follows:

Service Use and Location	Product	Remarks
1. Anchor Bolts Cast Into Concrete for Structural Steel, Metal Fabrications, and Castings		
Interior Dry Areas	Hot-dip galvanized steel headed anchor bolts, unless indicated otherwise.	
Exterior and Interior Wet Areas	Stainless steel headed anchor bolts.	See Section 09 90 00 – Painting and Coating
Submerged and Corrosive Areas	Stainless Steel headed anchor bolts	See Section 09 90 00 – Painting and Coating
2. Anchor Bolts Cast Into Concrete for Equipment Bases		
Interior Dry Areas	Stainless steel headed anchor bolts, unless otherwise specified with equipment	
Submerged, Exterior, Interior Wet, and Corrosive Areas	Stainless steel headed anchor bolts, unless unspecified with equipment	See Section 09 90 00 – Painting and Coating

Service Use and Location	Product	Remarks
3. Drilled Anchors for Metal Components to Cast–In–Place Concrete (e.g., Ladders, Handrail Post, Electrical Panels, and Equipment.		
Interior Dry areas	Zinc – plated or stainless steel wedge or expansion	Use stainless steel undercut anchors or overhead and ceiling installations
Submerged, Exterior, Interior Wet, and Corrosive Areas Adhesive stainless steel anchors	Adhesive stainless steel anchors	Use stainless steel undercut anchors or overhead and ceiling installations.
4. Anchors in Grout – Filled Concrete Masonry Units		
Exterior and Interior Wet and Dry Areas	Hot–Dip galvanized steel anchor bolts, zinc–plated or stainless steel sleeve anchors, or stainless steel adhesive anchors	
5. Anchors in Hollow Concrete Masonry Units		
Exterior and Interior Wet and Dry Areas	Zinc–plated or stainless steel sleeve anchors or stainless steel adhesive anchors with screen tube.	
6. Connections for Structural Steel Framing		
Exterior and Interior Wet and Dry Areas	High strength steel bolted connections	Use hot–dipped galvanized high–strength bolted connections for galvanized steel framing members
7. Connections for Steel Fabrications and Wood Components		
Exterior and Interior Wet and Dry Areas	Stainless Steel bolted connections	

B. Anti–seizing Lubricant: Use on all stainless steel threads.

C. Do not use adhesive anchors to support fire–resistive construction or where ambient temperature will exceed 120 degrees F.

END OF SECTION

INDEX TO

SECTION 05 51 00 – METAL STAIRS

SECTION 05 51 00

METAL STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Preassembled steel stairs with concrete-filled treads.

B. Related Sections:

1. Section 05 52 13 "Metal Railings" for pipe and tube railings.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Uniform Load: 100 lbf/sq. ft..

2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.

3. Uniform and concentrated loads need not be assumed to act concurrently.

4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.

5. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.

1.4 SUBMITTALS

A. Product Data: For metal stairs and the following:

1. Paint products.

2. Grout.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Provide templates for anchors and bolts specified for installation under other Sections.

2. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation and legally authorized to practice in South Carolina.

C. Welding certificates.

D. Qualification Data: For professional engineer.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.

1. Preassembled Stairs: Commercial class.

C. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."

2. AWS D1.3, "Structural Welding Code--Sheet Steel."

1.6 COORDINATION

A. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

B. Coordinate locations of hanger rods and struts with other work so that they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For components exposed to view in the completed Work,

provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513, Type 5 (mandrel drawn).

C. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

D. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, either commercial steel, Type B, or structural steel, Grade 25, unless another grade is required by design loads; exposed.

E. Uncoated, Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, either commercial steel, Type B, or structural steel, Grade 30, unless another grade is required by design loads.

2.3 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 25 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36.

1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for exterior stairs.

D. Machine Screws: ASME B18.6.3.

E. Lag Bolts: ASME B18.2.1.

F. Plain Washers: Round, ASME B18.22.1.

G. Lock Washers: Helical, spring type, ASME B18.21.1.

H. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

2. Material for Anchors in Exterior Locations: Alloy Group 1 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

D. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

2.5 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding, unless otherwise indicated.

2. Use connections that maintain structural value of joined pieces.

3. Fabricate treads and platforms of exterior stairs so finished walking surfaces slope to drain.

B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work true to line and level with accurate angles and surfaces and straight edges.

F. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. Weld exposed corners and seams continuously, unless otherwise indicated.

5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

2.6 STEEL-FRAMED STAIRS

A. Stair Framing: Fabricate stringers of structural-steel channels, plates, or a combination of both, as indicated. Provide closures for exposed ends of stringers. Construct platforms of structural-steel channel headers and miscellaneous framing members as indicated. Bolt or weld headers to stringers; bolt or weld framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.

1. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

B. Metal-Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.067 inch.

1. Steel Sheet: Uncoated cold- or hot-rolled steel sheet.

2. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.

3. Attach risers and subtreads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.

4. Shape metal pans to include nosing integral with riser.

5. Attach abrasive nosings to risers.

6. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.

2.7 FINISHES

A. Comply with NAAMM'S "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal stairs after assembly.

C. Galvanizing: Hot-dip galvanize exterior items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

2. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

D. Finish Painting: Finish painting of stairs is specified in Section 09 90 00 "Painting & Protective Coating."

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free from rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete, unless otherwise indicated.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.

F. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

3.2 ADJUSTING AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

INDEX TO

SECTION 05 52 13 – METAL RAILINGS

SECTION 05 52 13

METAL RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Exterior aluminum tube railings.

B. Related Sections include the following:

1. Division 05 Section "Metal Stairs" for metal stair assembly to receive aluminum tube railings.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Handrails and Top Rails of Guards:
   a. Uniform load of 50 lbf/ ft. applied in any direction.
   b. Concentrated load of 200 lbf applied in any direction.
   c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:
   a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
   b. Infill load and other loads need not be assumed to act concurrently.

B. Thermal Movements: Provide exterior railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Grout and anchoring cement.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.2, "Structural Welding Code--Aluminum."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION AND SCHEDULING

A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Aluminum Pipe and Tube Railings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ATR Technologies, Inc.
   b. Blum, Julius & Co., Inc.
   c. Superior Aluminum Products, Inc.
   d. Tubular Specialties Manufacturing, Inc.
   e. Wagner, R & B, Inc.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

2.3 ALUMINUM

A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.

B. Extruded Bars and Tubing: ASTM B 221, Alloy 6063-T5/T52.

C. Drawn Seamless Tubing: ASTM B 210, Alloy 6063-T832.

D. Plate and Sheet: ASTM B 209, Alloy 6061-T6.

2.4 FASTENERS

A. General: Provide the following:

1. Aluminum Railings: Type 304 stainless-steel fasteners.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.

D. Anchors: Provide cast-in-place chemical or torque-controlled expansion anchors, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

D. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations and where indicated provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.6 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32-inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with either welded or nonwelded connections unless otherwise indicated.

H. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

I. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.

J. Form changes in direction as follows:

1. By bending.

K. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

L. Close exposed ends of railing members with prefabricated end fittings.

M. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated.

O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

P. For removable railing posts, fabricate slip-fit sockets from stainless-steel tube or pipe whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.

2.7 ALUMINUM FINISHES

A. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

B. Clear Anodic Finish: AAMA 611, AA-M12C22A41.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Adjust railings before anchoring to ensure matching alignment at abutting joints.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.2 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in Part 2 "Fabrication" Article whether welding is performed in the shop or in the field.

C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to 1 side, and locate joint within 6 inches of post.

3.3 ATTACHING RAILINGS

A. Anchor railing ends at walls with round flanges anchored to wall construction and welded to railing ends or connected to railing ends using nonwelded connections.

B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends or connected to railing ends using nonwelded connections.

C. Attach railings to wall with wall brackets, except where end flanges are used. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

D. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.

3.4 ANCHORING POSTS

A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material.

C. Leave anchorage joint exposed; wipe off surplus anchoring material; and leave 1/8-inch buildup, sloped away from post.

3.5 ADJUSTING AND CLEANING

A. Clean aluminum by washing thoroughly with clean water and soap and rinsing with clean water.

3.6 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION

INDEX TO

SECTION 05 53 00 – METAL GRATINGS

SECTION 05 53 00

METAL GRATINGS

PART 1 – GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM):

a. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shape, and Tubes.

2. National Association of Architectural Metal Manufacturers (NAAMM):

a. MBG 531, Metal Bar Grating Manual.
b. MBG 532, Heavy-Duty Metal Bar Grating Manual.

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:

a. Grating: Show dimensions, weight, and size, and location of connections to adjacent grating, supports, and other Work.
b. Grating Anchorage: Show structural calculations and details of anchorage to supports to prevent displacement from traffic impact.
c. Grating Supports: Show dimensions, weight, size, location, and anchorage to supporting structure.
d. Catalog information and catalog cuts.
e. Manufacturer's specifications, to include coatings.

B. Informational Submittals:

1. Special handling and storage requirements.
2. Installation instructions.
3. Factory test reports.
4. Manufacturer's Certification of Compliance for specified products.
5. Written Test Report that swaged crossbars, if used on grating, meet the requirements of the specified test and additional requirements of these Specifications.

1.03 PREPARATION FOR SHIPMENT

A. Insofar as is practical, factory assemble items provided.

B. Package and clearly tag parts and assemblies that are of necessity shipped unassembled and protect the materials from damage, and facilitate identification and final assembly in the field.

PART 2 – PRODUCTS

2.01 FOOT TRAFFIC GRATING

A. Design Criteria:

1. Uniform Service Load shall be as noted on the drawings.

B. Description:

1. Aluminum Pressure Locked Bar type grating.
2. Maximum Deflection: 1/4 inch, unless otherwise shown.
3. Space bearing bars as required for design loads, with a maximum of 1-inch center-to-center.
4. Bearing bar depth shall be minimum required to meet loading requirements and design conditions.
5. Bearing bar thickness shall be 3/16" to provide ¾" between bars.
6. Top surface of bars: Slip Resistant
7. Cross Bar spacing: 2" or 4" on center, as required to meet loading requirements and design conditions.
8. Banding: 3/16 inch minimum, same material as grating; NAAMM MBG 531 and NAAMM MBG532

C. Manufacturers:

1. Ohio Gratings Inc. Type 15-ADT-2 or 4 or
2. Borden Gratings Inc., Type L or LF.

D. Materials:

1. Aluminum bearing bars and banding shall be 6063-T6 and Aluminum Cross Bars shall be 6063-T52; ASTM B221.
2. Finish: Mill Finish.

2.02 ACCESSORIES

A. Except where noted otherwise, hardware and removable fastener clips shall be stainless steel, as recommended by manufacturer, compatible with grating system, and capable of meeting the loading requirements with appropriate safety factors.

B. Removable Fastener Clips shall be removable from above grating walkway surface.

C. Partially Removable Anchor:

1. Bolt: Threaded stud, Type 304 or Type 316 stainless steel.

   a. Manufacturer: Nelson Stud Welding Co., Lorain, OH.

2. Hat Bracket: Type 304 'stainless steel.

   a. Manufacturer: STRUCT-FAST, Wellesley Hills, MA.

2.03 FABRICATION

A. General:

1. Exposed Surfaces: Smooth finish and sharp, well-defined lines.
2. Furnish necessary rabbets, lugs, and brackets so work can be assembled in a neat, substantial manner.
3. Conceal fastenings where practical.
4. Drill metalwork and countersink holes as required for attaching hardware or other materials.
5. Weld Connections: Not permitted on grating except at banding bars.

B. Design:

1. Field measure areas to receive grating, Verify dimensions of new fabricated supports, and fabricate to dimension required for specified clearances.
2. Section Length: Sufficient to prevent its falling down through clear opening when oriented in the span direction when one end is touching either the concrete or the vertical leg of grating support.
3. Minimum Bearing & Fabrication Tolerances shall be in accordance with NAAMM MBG 53l.
4. Crossbars: Flush with top of main bar and extend downward a minimum of 50 percent of the main bar depth.
6. Do not use weld type crossbars.
7. Furnish stainless steel Type 304 or Type 316 threaded anchor studs, as fasteners for grating attachment to metal supports either not embedded or partially embedded in concrete, as manufactured by Nelson Studs Welding Co., Lorain, OH.

C. Supports:

1. Seat Angles and Beams:

   a. To be designed and provided by grating manufacturer.
   b. To be same material as rectangular bar grating.
   c. Extruded aluminum frame with slot for recessed grating clips.

2. Coordinate dimensions and fabrication with grating to be supported.
3. Coordinate dimensions with increased depth due to serrations (if applicable).
4. Welded Frames with Anchors: Continuously welded.

E. Aluminum:

1. ASTM B221 extruded shapes.
2. Fabricate as shown and in accordance with manufacturer's recommendations.
3. Grind smooth sheared edges exposed in the finished work.

F. Foot Traffic Grating: Any single grating section, individual plank, or plank assembly shall be not less than 1 foot 6 inches or greater than 3 feet 0 inch in width or weigh more than 160 pounds.

PART 3 – EXECUTION

3.01 PREPARATION

A. Electrolytic Protection:

1. Aluminum in contact with dissimilar metals, other than stainless steel, and embedded or in contact with masonry, grout, and concrete, protect surfaces as specified in Section 09 90 00, Painting and Coating.
2. Allow paint to dry before installation of the material.

3.02 INSTALLATION

A. Installation shall be in accordance with manufacturer's recommendations.

B. Install supports such that grating sections have a solid bearing on both ends, and that rock and wobble grating movement does not occur under designed traffic loading.

C. Install plumb or level as applicable.

D. Install welded frames with anchors to straight plane without offsets.

E. Completed installation shall be rigid and neat in appearance.

F. Protect painted surfaces during installation. Should coating become marred, prepare and touch up surface in accordance with paint manufacturer's instructions.

END OF SECTION

INDEX TO

SECTION 06 40 13 – EXTERIOR ARCHITECTURAL WOODWORK

SECTION 06 40 13

EXTERIOR ARCHITECTURAL WOODWORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Exterior standing and running trim.
2. Exterior plywood soffit panels.
3. Shop priming exterior woodwork.

1.3 SUBMITTALS

A. Product Data: For each type of product and process indicated and incorporated into items of exterior architectural woodwork during fabrication, finishing, and installation.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components. Provide shop drawings for entry wood and extended rafters.

1. Show details full size.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of products.

C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of exterior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1.5 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation of exterior woodwork only when existing and forecasted weather conditions permit work to be performed and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.

1.6 COORDINATION

A. Coordinate sizes and locations of framing, blocking, reinforcements, and other related units of Work specified in other Sections to ensure that exterior architectural woodwork can be supported and installed as indicated.

PART 2 – PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Products: Comply with the following:

1. Lumber: DOC PS 20.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA C2 (lumber) and AWPA C9 (plywood) and the following:

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.

2. Kiln-dry lumber and plywood after treatment (KDAT) to a maximum moisture content, respectively, of 19 and 15 percent. Do not use materials that are warped or do not comply with requirements for untreated materials.

3. Mark each treated item with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.

B. Extent of Treatment: Treat exterior architectural woodwork by pressure process.

2.3 INSTALLATION MATERIALS

A. Blocking, Shims, and Nailers: Softwood or hardwood lumber, pressure-preservative treated, fire-retardant treated where indicated, kiln dried to less than 15 percent moisture content.

B. Nails and Screws: Hot-dip galvanized or stainless steel.

C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts, unless otherwise indicated. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.4 FABRICATION, GENERAL

A. Wood Moisture Content: 15 to 19 percent.

B. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Edges of Solid-Wood (Lumber) Members 3/4 Inch Thick or Less: 1/16 inch.
2. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.

C. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

D. Shop cut openings, to maximum extent possible, to receive hardware, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges of cutouts and seal with a water-resistant coating suitable for exterior applications.

2.5 EXTERIOR STANDING AND RUNNING TRIM

A. Grade: Custom.

B. Backout or groove backs of flat trim members, and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

C. Wood Species: Southern Yellow Pine, pressure preservative treated.

1. Do not use plain-sawn lumber with exposed, flat surfaces more than 3 inches wide.

2.6 EXTERIOR PLYWOOD SOFFIT PANELS

A. Plywood T-111 Soffit Panels: APA-rated siding, pressure-preservative treated.

1. Face Grade: 303- oc.
2. Thickness: Not less than 5/8 inch.
3. Face Species: Southern Pine.
4. Pattern: Texture 1-11; grooves 4 inches o.c.
5. Application: Textured face down at exposed underside of soffits.

2.7 MISCELLANEOUS MATERIALS

A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches into wood substrate.

1. For pressure-preservative-treated wood, provide stainless-steel or hot-dip galvanized-steel fasteners.

B. Wood Glue: Waterproof resorcinol glue recommended by manufacturer for exterior carpentry use.

C. Flashing: Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim" for flashing materials installed in exterior finish carpentry.

2.8 SHOP PRIMING

A. Woodwork for Opaque Finish: Shop prime woodwork for paint finish with one coat of wood primer specified in Division 09 painting Sections.

B. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

PART 3 – EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Deliver concrete inserts and similar anchoring devices to be built into substrates well in advance of time substrates are to be built.

C. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and back priming.

3.2 INSTALLATION

A. Quality Standard: Install woodwork to comply with same grade specified in Part 2 for type of woodwork involved.

B. Install woodwork true and straight with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

D. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes according to AWPA M4.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk concealed fasteners and blind nailing. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork.

F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 36 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.

1. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

G. Complete finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail and screw holes with matching filler where exposed.

H. Refer to Division 09 Sections for final finishing of installed architectural woodwork.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; replace woodwork where not possible to repair. Adjust joinery for uniform appearance.

B. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION

INDEX TO

SECTION 07 21 00 – THERMAL INSULATION

SECTION 07 21 00

THERMAL INSULATION

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board.
2. Glass-fiber batts.
3. Closed cell spray foam insulation.

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM):

a. C578, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
b. C665, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
c. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
d. E96, Standard Test Methods for Water Vapor Transmission of Materials.

1.02 DELIVERY, STORAGE, AND HANDLING

A. On packaging clearly identify manufacturer, contents, brand name, applicable standard, and R-value.

B. Store materials off ground and keep them dry at all times. Protect against weather, condensation, and damage.

PART 2 – PRODUCTS

2.01 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD

A. Extruded Polystyrene Board, Type IV: ASTM C 578, Type IV, 25-psi minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. DiversiFoam Products.

2. Dow Chemical Company.
3. Owens Corning.
4. Pactiv.

2.02 GLASS FIBER BLANKET INSULATION

A. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

B. Manufacturers:

1. CertainTeed Corporation.
2. Johns Manville.
3. Owens Corning.

2.03 SPRAY FOAM INSULATION

A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Corporation.
b. BaySystems NorthAmerica, LLC.
c. Henry Company.
d. NCFI; Division of Barnhardt Mfg. Co.
e. Icynene, Inc.

2. Minimum density of 1.5 lb/cu. ft., thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F.

B. Thermal Barrier for Exposed Spray Foam Insulation: Provide spray applied mineral wool thermal barrier complying with NFPA 275 "Standard Method of Fire Test for the Evaluation of Thermal Barriers Used Over Foam Plastic Insulation." Provide 1-1/2 inch thickness, unless otherwise indicated.

1. Basis-of-Design Product: Firestop TB by Amerrock Products.

C. Ignition Barrier for Exposed Spray Foam Insulation: Provide the following in accordance with applicable code:

1. Ignition Barrier Protective Coating: Aldocoat 757 by Aldo Products Company, Inc.; 7.5-mil minimum dry mil thickness.
2. or other code approved material consistent with type of construction.

PART 3 – EXECUTION

3.01 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD INSULATION

A. Install board insulation over concrete or concrete masonry units using Z-shaped furring as specified in Section 09 22 16. Install according to manufacturer's written instructions.

3.02 GLASS-FIBER BLANKET INSULATION

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

B. Install glass-fiber blankets in cavities formed by framing members according to the following requirements:

1. Use blanket widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically.

3.03 SPRAY FOAM INSULATION

A. Spray Foam Insulation: Apply spray foam insulation to underside of floor and roof decks, as indicated and according to manufacturer's written instructions.

1. Apply spray foam insulation to thickness or R-value as indicated on Drawings (R-30 at roof).
2. Apply thermal barrier or ignition barrier over exposed spray foam insulation as required for code compliance.

END OF SECTION

INDEX TO

SECTION 07 41 13 – METAL ROOF PANELS

SECTION 07 41 13

METAL ROOF PANELS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Standing-seam metal roof panels.
2. Metal soffit panels.
3. Self-adhering roof underlayment.
4. Flashing and trim.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide metal roof panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.

B. Air Infiltration: Air leakage of not more than 0.003 cfm/sq. ft. when tested according to ASTM E 1680 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft.

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:

1. Test-Pressure Difference: 8.00 lbf/sq. ft.

D. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift resistance class indicated.

E. Uniform Wind Load Capacity: Design, size and install components to withstand positive and negative wind loading pressures in accordance with applicable Code, as verified by Structural Engineer.

F. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and wind loads as indicated on Structural Drawings, based on testing according to ASTM E 1592.

G. Thermal Movements: Provide metal roof panel assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing

of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal roof panel and accessory.

1. Provide information for roll-forming equipment and certified operator.

B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.

1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. Provide calculations of potential expansion and contraction of panels and indicate details to accommodate movement.

C. Coordination Drawings: Roof plans drawn to scale and coordinating penetrations and roof-mounted items. Show the following:

1. Roof panels and attachments.
2. Roof-mounted items.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Metal Roof and Soffit Panels: 12 inches long by actual panel width. Include fasteners, clips, fascias, closures, and other metal roof panel accessories at roof edge.
2. Trim and Closures: 12 inches long. Include fasteners and other exposed accessories.
3. Accessories: 12-inch- long Samples for each type of accessory.

E. Qualification Data: For Installer.

F. Field quality-control inspection reports.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for the following:

1. Metal Roof Panels: Include reports for air infiltration, water penetration, and structural performance.

H. Maintenance Data: For metal roof panels to include in maintenance manuals.

I. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An employer or workers trained and certified by the manufacturer of standing seam roof systems. Installer must provide certification and proof of formal training and certification by the manufacturer who requires same training and certification for issuance of specified warranties.

1. Installer's responsibilities include fabricating and installing metal roof panel assemblies and providing professional engineering services needed to assume engineering responsibility.
2. Engineering Responsibility: Preparation of data for metal roof panels, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Sole Source Responsibility for Roofing: A single Roofing Contractor shall be responsible for providing, coordinating and installing all types of roofing required for project.

C. UL-Certified, Portable Roll-forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work. Portable roll-forming equipment must have a minimum of 16 stands and must be operated by a factory trained technician. On-site roll-forming by the roofing contractor is not acceptable.

D. Pre-installation Conference: Conduct conference at Project site to comply with requirements in 01 00 01 and 01 33 00." Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, metal roof panel Installer, metal roof panel manufacturer's representative, deck Installer, and installers whose work interfaces with or affects metal roof panels including installers of roof accessories.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays. Ensure that metal roof panel installation schedule will prevent water intrusion which could promote mold growth.
3. Review methods and procedures related to metal roof panel installation, including manufacturer's written instructions.
4. Examine deck substrate conditions for compliance with requirements, including flatness and attachment to structural members.
5. Review structural loading limitations of deck during and after roofing.
6. Review flashings, special roof details, roof drainage, roof penetrations, and condition of other construction that will affect metal roof panels.
7. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.

8. Review temporary protection requirements for metal roof panel assembly during and after installation.
9. Review roof observation and repair procedures after metal roof panel installation.
10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.

B. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

1.7 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal roof panels to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify locations of roof framing and roof opening dimensions by field measurements before metal roof panel fabrication and indicate measurements on Shop Drawings.

1.8 COORDINATION

A. Coordinate installation of roof curbs and roof penetrations.

B. Coordinate metal panel roof assemblies with rain drainage work, flashing, trim, and construction of decks, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal roof panel assemblies that fail in materials or workmanship within specified warranty period. No Dollar Limit of Liability.

1. Failures include, but are not limited to, the following:
   a. Structural failures, including rupturing, cracking, or puncturing.

b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Ten years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 PANEL MATERIALS

A. Metallic-Coated Steel Sheet Pre-painted with Coil Coating: Steel sheet metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality.
2. Concealed Finish: Apply pretreatment and manufacturer's standard acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
3. Surface: Smooth, striated finish.

2.2 MISCELLANEOUS MATERIALS

A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating.

1. Fasteners for Roof Panels: Self-drilling or self-tapping 410 stainless or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal roof panels.
2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.

B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be field assembled by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using

concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

B. Vertical-Rib, Snap-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and a striated pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together with narrow batten.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. AEP-Span.
   b. McElroy Metal, Inc. – "Medallion I" (Basis of Design).
   c. Metal Sales Manufacturing Corporation.
   d. Petersen Aluminum Corporation.
   e. Tremco.

2. Material: Aluminum-zinc alloy-coated steel sheet, 0.028-inch-thick (24 gage).

   a. Exterior Finish for Roof Panels: "Galvalume Plus" or equal.

3. Clips: One-piece fixed to accommodate thermal movement.

   a. Material: 0.028-inch- thick, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.

3. Panel Coverage: 16 inches.

4. Panel Height: 1 inch.

5. Uplift Rating: UL 120, or as otherwise required to withstand positive and negative wind loading pressures in accordance with International Building Code for applicable mph wind speed, as verified by structural engineer.

2.4 METAL SOFFIT PANELS

A. General: Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

B. Flush-Profile Metal Soffit Panels: Solid panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between edges, with flush joint between panels. Soffit panel to be equal to Marquee-Lok by McElroy Metal.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Marquee-Lok by McElroy Metal or Architect approved comparable product.
2. Material: Same material as metal roof panels.

a. Nominal Thickness: 0.028 inch.
b. Exterior Finish: Two-coat fluoropolymer.
c. Color: As selected by Architect from manufacturer's full range.

3. Panel Coverage: 12 inches.

4. Panel Height: 1.0 inch.

2.5 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: 30 to 40 mils thick minimum, consisting of slip-resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
3. Products: Subject to compliance with requirements, provide one of the following:

a. Carlisle Coatings & Waterproofing Inc., Div. of Carlisle Companies Inc.; CCW WIP 300HT.
b. Cetco; Strongseal.
c. Henry Company; Blueskin High Temp.

2.6 ACCESSORIES

A. Miscellaneous Metal Sub-framing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels, unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or pre-molded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Formed from minimum 0.024-inch- thick, aluminum-zinc alloy-coated steel sheet. Provide flashing and trim as required to seal against weather

and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

1. Color: To match roof panels, unless indicated otherwise.

D. Pipe Flashing: Pre-molded, EPDM pipe collar with flexible aluminum ring bonded to base.

2.7 FABRICATION

A. General: Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Where indicated, fabricate metal roof panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will minimize noise from movements within panel assembly.

C. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
3. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal roof panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal roof panel manufacturer for application but not less than thickness of metal being secured.

2.8 FINISHES, GENERAL

A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within

the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of work.

1. Examine roof framing to verify that rafters and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install sub-framing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

1. Soffit Framing: Wire tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free, on roof sheathing under metal roof panels. Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply over entire roof area, in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.4 METAL ROOF PANEL INSTALLATION

A. General: Install metal roof panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal roof panels and other

components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal roof panels.
2. Flash and seal metal roof panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal roof panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal roof panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

B. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
4. Watertight Installation:

    a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
    b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
    c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

3.5 METAL SOFFIT PANEL INSTALLATION

A. General: Install metal soffit panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal soffit panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal soffit panels.
2. Flash and seal metal soffit panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal soffit panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal soffit panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal soffit panel manufacturer.

D. Lap-Seam Metal Soffit Panels: Fasten metal soffit panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal soffit panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

E. Watertight Installation:

1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal soffit panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.

2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

3.6 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

C. Pipe Flashing: Form flashing around pipe penetration and metal panels. Fasten and seal to panel as recommended by manufacturer.

3.7 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal roof panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.8 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect completed metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.

C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.9 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

INDEX TO

SECTION 07 46 46 – FIBER–CEMENT TRIM

SECTION 07 46 46

FIBER-CEMENT TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Fiber-cement trim.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 PERFORMANCE REQUIREMENTS

A. Uniform Wind Load Capacity: Design, size and install components to withstand positive and negative wind loading pressures in accordance with International Building Code, as determined by Structural Engineer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials in a dry, well-ventilated, weathertight place.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only if substrate is completely dry and if existing and forecasted weather conditions permit siding to be installed according to manufacturer's written instructions.

1.7 SEQUENCING

A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace trim that does not comply with requirements or that fails within specified warranty period. Failures include, but are not limited to, cracking, deforming, or otherwise deteriorating beyond normal weathering.

1. Warranty Period: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIBER-CEMENT TRIM

A. Fiber Cement Trim: Made from fiber-cement board that does not contain asbestos fibers; complies with ASTM C 1186, Type A, Grade II; classified as noncombustible when tested according to ASTM E 136.

1. Size: As indicated on drawings.

2. Texture: Smooth.

3. Thickness: As indicated.

4. Finish: Factory prime painted.

B. Elastomeric Joint Sealant: Single-component nonsag urethane joint sealant.

1. Caulk all joints between fiber cement trim pieces.

C. Fasteners: Stainless steel.

1. Stainless steel.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of trim. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Clean substrates of projections and substances detrimental to application.

3.2 INSTALLATION

A. Fiber Cement Trim: Comply with manufacturer's written installation instructions applicable to products and applications indicated, unless more stringent requirements apply.

1. Install flashing around all wall openings.

2. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum 3/4 inch or full thickness of sheathing. Additional fasteners may be required to ensure adequate security.

3. Place fasteners no closer than 3/4 inch and no further than 2 inches from side edge of trim board and no closer than 1 inch from end. Fasten maximum 16 inches on center.

4. Maintain clearance between trim and adjacent finished grade.

5. Trim inside corner with a single board trim both side of corner.

6. Outside Corner Board Attach Trim on both sides of corner with 16 gage corrosion resistant finish nail 1/2 inch from edge spaced 16 inches apart, weather cut each end spaced minimum 12 inches apart.

7. Allow 1/8-inch gap between trim and adjacent cladding. Seal gap with high quality, paint-able caulk.

3.3 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION

INDEX TO

SECTION 07 62 00 – SHEET METAL FLASHING AND TRIM

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 – GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM):

a. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
b. C920, Standard Specification for Elastomeric Joint Sealants.
c. C 1311, Standard Specification for Solvent Release Sealants.
d. D1187, Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
e. D4586, Standard Specification for Asphalt Roof Cement, Asbestos-Free.
fi. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual, 5th Edition.

1.02 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Fabricate and install roof edge flashing capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49.

C. Wind Pressure: Provide anchorage for sheet metal flashing and trim that resists wind pressures as shown on Structural Drawings.

D. Thermal Movements:

1. Provide sheet metal flashing and trim that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.
2. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements.
3. Temperature Change (Range): 120 degrees F, ambient; 180 degrees F, material surfaces.

E. Water Infiltration: Provide sheet metal flashing and trim that does not allow water infiltration to building interior.

1.03 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown, unless more stringent requirements are indicated.

1.04 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:

a. Show joints, types and location of fasteners, and special shapes.
b. Catalog data for stock manufactured items.

2. Samples: Color Samples for items to be factory finished.

1.05 DELIVERY, HANDLING, AND STORAGE

A. Inspect for damage, dampness, and wet storage stains upon delivery to Work Site.

B. Remove and replace damaged or permanently stained materials that cannot be restored to like-new condition.

C. Carefully handle to avoid damage to surfaces, edges, and ends.

D. Do not open packages until ready for use.

E. Store materials in dry, weathertight, ventilated areas until immediately before installation.

PART 2 – PRODUCTS

2.01 METALS

A. Prefinished Aluminum Sheet: ASTM B209, alloy and temper as required for application and finish: 0.032-inch thick; mill finish; shop pre-coated with fluoropolymer coating (Kynar polyvinylidene fluoride resin) coating; color as selected by Architect.

B. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 316, dead soft, fully annealed; with smooth, flat surface; 0.016-inch-thick unless otherwise indicated; 2D finish.

2.02 TYPICAL FLASHING AND TRIM

A. Stainless steel sheet.

2.03 GUTTERS AND DOWNSPOUTS

A. Prefinished aluminum sheet.

2.04 ANCILLARY MATERIALS

A. Sealing Tape: Polyisobutylene sealing tape.

B. Isolation Tape: Butyl or polyisobutylene, internally reinforced, or 20-mil thick minimum polyester.

C. Plastic Roof Cement: ASTM D4586, Type II.

D. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.

F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.

G. Fasteners:

1. For Stainless Steel: Stainless steel.
2. For Aluminum: Stainless steel or aluminum; reglet fasteners may be galvanized or cadmium-plated steel.

2.05 FABRICATION OF FLASHING

A. Field measure prior to fabrication.

B. Fabricate in accordance with SMACNA Architectural Sheet Metal Manual that apply to design, dimensions, metal, and other characteristics of item indicated.

C. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

D. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

E. Seams for Stainless Steel: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

F. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

G. Reinforcements and Supports: Provide same material as flashing, unless other material is shown. Steel, where shown or required, shall be galvanized or stainless.

H. Rigid Joints and Seams: Make mechanically strong. Seal aluminum joints with sealant.

I. Sealed Joints: Form non–expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

J. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than I-inch deep, filled with butyl sealant concealed within joints.

K. Fabricate sheet metal in 10-foot maximum lengths, unless otherwise indicated.

L. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

M. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" and FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

2.06 FABRICATION OF GUTTER AND DOWNSPOUTS

A. Gutters and Downspouts: Manufactured formed gutter in uniform section lengths not exceeding 12 feet, with mitered and welded or soldered corner units, end caps, outlet tubes, and other accessories. Elevate back edge at least 1 inch above front gutter rim. Furnish with flat-stock gutter straps and gutter support brackets and expansion joints and expansion-joint covers fabricated from same metal as gutters.

1. Fabricate gutter from aluminum sheet, 0.032 inch thick.
2. Gutter Style: As indicated, according to SMACNA's "Architectural Sheet Metal Manual."
3. Downspouts: Rectangular with mitered elbows, manufactured from formed aluminum, 0.032 inch thick. Furnish wall brackets, from same material and finish as downspouts, with anchors.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Flashing:

1. General: Install sheet metal roof flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.
2. Isolate metal from wood and concrete and from dissimilar metal with isolation tape or two coats of isolation paint.
3. Use only stainless-steel fasteners to connect isolated dissimilar metals.
4. Joints: 10-foot maximum spacing and 2-1/2 feet from corners, butted with 3/16-inch space centered over matching 8-inch-long backing plate with sealing tape in laps.
5. Set flanges of flashings and roof accessories on continuous sealer tape or in plastic roof cement on top of envelope ply of roofing. Nail flanges through sealing tape and at 3-inch maximum spacing. Touch up isolation paint on flanges.
6. Joints, Fastenings, Reinforcements, and Supports: Sized and located as required to preclude distortion or displacement due to thermal expansion and contraction.
7. Provide continuous hold–down clips at counter flashing and gravel stops.
8. Conceal fastenings wherever possible.
9. Set flashing and sheet metal to straight, true lines with exposed faces aligned in proper plane without bulges or waves.

B. Prefabricated Metal Systems:

1. Follow system manufacturer's printed instructions.
2. Place color variations in pieces so no extremes are next to each other.

3.03 GUTTERS AND DOWNSPOUTS

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

B. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored gutter brackets spaced not more than 36 inches apart. Provide end closures and seal watertight with sealant. Slope to downspouts.

1. Fasten gutter spacers to front and back of gutter.

2. Anchor and loosely lock back edge of gutter to continuous cleat.
3. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.

C. Downspouts: Join sections with 1-1/2-inch telescoping joints.

1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c. in between.

3.04 FINISH

A. Exposed Surfaces of Flashing and Sheet Metalwork: Free of dents, scratches, abrasions, or other visible defects, and clean and ready for painting where applicable.

3.05 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

C. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

INDEX TO

SECTION 07 84 00 – FIRESTOPPING

SECTION 07 84 00

FIRESTOPPING

PART 1 – GENERAL

1.01 REFERENCES

A. The following is a list of standards that may be referenced in this section:

1. ASTM International (ASTM):

a. E814, Test Method for Fire Tests of Through-Penetration Firestops.

2. Underwriters Laboratory, Inc. (UL):

a. 1479, Fire Tests of Through-Penetration Firestops.
b. 2079, Tests for Fire Resistance of Building Joint Systems.

1.02 SYSTEM DESCRIPTION

A. Provide systems of material or combination of materials used to fill openings around penetrating items to prevent the spread of fire and retain integrity of fire rated construction by maintaining an effective barrier against spread of flame, smoke, water, and hot gases through penetrations in fire rated wall and floor assemblies.

B. Provide Fire Safing:

1. At slot gaps between edge of floor slabs and exterior walls.
2. Gaps between top of walls and structure above.
3. Expansion joints in walls, floors, and ceilings.

C. Performance Requirements: Provide firestop systems with materials that have been manufactured and installed to maintain performance criteria stated by manufacturer without defects, damage, or failure.

D. Regulatory Requirements:

1. Firestop Systems: Meet requirements of ASTM E814, UL 1479, or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
2. Proposed Firestop Materials and Methods: Conform to applicable governing codes having local jurisdiction.
3. Meet F and T ratings of ASTM E814 for a period equal to construction penetrated.
4. Underwriters Laboratories classified as fill, void, or cavity materials under UL 1479.

1.03 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Show layout, profiles, and product components; include UL Systems Number on Shop Drawings and diagram of UL approved assembly.
2. Product Data: Include manufacturer's SPEC-DATA® product sheet for products selected for use.

B. Informational Submittals:

1. Manufacturer's installation instructions.

2. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

3. Certificates:

a. Product certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical requirements.
b. Certificate indicating installer qualifications.
c. Certificate of Proper Installation.

4. Special Guarantee documents specified below.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Experienced in performing Work of this section and specialized in the installation of work similar to that required for this Project.

B. Pre-installation Meetings: Conduct pre-installation meeting to identify where seals are required and verify Project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at Project Site.

B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification and UL listing mark intact.

C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.

D. Follow recommended procedures, precautions, or remedies described in Material Safety Data Sheets as applicable.

1.06 SEQUENCING AND SCHEDULING

A. Firestopping requirements may be created by mechanical and electrical portions of the Work:

1. Identify locations requiring firestopping.
2. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

1.07 SPECIAL GUARANTEE

A. Provide manufacturer's extended guarantee or warranty, with Owner named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction of equipment found defective during a period of 2 years after the date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work shall be as specified in the General Conditions.

PART 2 – PRODUCTS

2.01 GENERAL

A. Furnish firestop system products from a single manufacturer.

2.02 MANUFACTURERS

A. 3M Corp.; Firestopping Products.

B. Hilti Construction Chemicals; High Performance Firestop Systems.

C. International Protective Coatings Corp. (IPC); Flamesafe Firestop Products.

D. Isolatek International (Cafco); TPS.

E. Specified Technologies; Inc. (STI).

2.03 MIXES

A. For those products requiring mixing prior to application, follow firestopping manufacturer's directions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce firestopping products of uniform quality with optimum performance characteristics for application indicated.

PART 3 – EXECUTION

3.01 EXAMINATION

A. With manufacturer's representative, examine substrates and conditions for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Cleaning: Clean openings and joints immediately prior to installing firestopping in accordance with firestop manufacturer recommendations and the following requirements:

1. Remove foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.
2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form release agents from concrete.

B. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing firestopping seal with substrates.

3.03 INSTALLATION

A. Manufacturer's Instructions: Follow manufacturer's instructions for installation of through-penetration systems selected for use.

1. Seal holes or voids made by penetrations for pipes, conduits, and ducts through fire-rated floors, walls, and roofs and to ensure air and water-resistant seals.
2. Receive Engineer's approval prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.

B. Fire Safing: Install, following manufacturer's instructions, to completely fill gaps between tops of fire-rated walls and floor or roof deck above, between edge of floors and walls, and other locations indicated on Drawings.

C. Meet Underwriters Laboratories and Factory Mutual requirements.

3.04 FIELD QUALITY CONTROL

A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.

B. Keep areas of Work accessible until inspection by applicable code authorities.

C. Perform patching and repairing of firestopping caused by cutting or penetrating existing firestop systems.

3.05 MANUFACTURER'S SERVICES

A. Provide manufacturer's representative at Site, for installation assistance, inspection, and certification of proper installation, and training of installer's personnel in proper installation procedures.

3.06 PROTECTION

A. Protect installed product from contact with contaminating substances and from damage during construction.

END OF SECTION

INDEX TO

SECTION 07 92 00 – JOINT SEALANTS

SECTION 07 92 00

JOINT SEALANTS

PART 1 – GENERAL

1.01 REFERENCES

A. The following is a list of standards, which may be referenced in this section:

1. ASTM International (ASTM):

a. C661, Standard Test Method for Indentation Hardness of Elastomeric Type Sealants by Means of a Durometer.
b. C834, Standard Specification for Latex Sealants.
c. C920, Standard Specification for Elastomeric Joint Sealants.
d. C1193, Standard Guide for Use of Joint Sealants.

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Surface preparation instructions. Indicate where each product is proposed to be used.
2. Samples: Material proposed for use showing color range available.

B. Informational Submittals:

1. Installation instructions.
2. Documentation showing applicator qualifications.
3. Manufacturer's Certificate of Compliance.
4. Special guarantee.

1.03 QUALITY ASSURANCE

A. Applicator Qualifications: Minimum of 5 years' experience installing sealants in projects of similar scope.

1.04 ENVIRONMENTAL REQUIREMENTS

A. Ambient Temperature: Between 40 degrees F and 80 degrees F when sealant is applied. Consult manufacturer when sealant cannot be applied within these temperature ranges.

1.05 SPECIAL GUARANTEE

A. Product: Furnish manufacturer's extended guarantee or warranty, with Owner named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction of equipment found defective during a period of 5 years after the date of Substantial Completion. Duties and obligations for correction or

removal and replacement of defective Work shall be as specified in the General Conditions.

B. Conditions: No adhesive or cohesive failure of sealant.

C. Sealed Joints: Watertight and weather-tight with normal usage.

PART 2 – PRODUCTS

2.01 SEALANT MATERIALS

A. Characteristics:

1. Uniform, homogeneous.
2. Free from lumps, skins, and coarse particles when mixed.
3. Non-staining, non-bleeding.
4. Hardness of 15 minimum and 50 maximum, measured by ASTM C661 method.
5. Immersible may be substituted for non-immersible.

B. Color: Unless specifically noted, match color of the principal wall material adjoining area of application.

C. Type I-Silicone, Non-sag, Non-immersible:

1. Silicone base, single-component, moisture curing; ASTM C920, Type S, Grade NS, Class 25.
2. Capable of withstanding movement up to 50 percent of joint width.
3. Manufacturers and Products:

    a. Dow Corning Corp.; No. 790.
    b. General Electric; Silpruf.
    c. BASF; Sonneborn, Omniseal-50.

D. Type 2-Multipart Polyurethane, Self-leveling, Immersible:

1. Polyurethane base, multi component, chemical curing; ASTM C920, Type M, Grade P, Class 25.
2. Capable of being continuously immersed in water.
3. Manufacturers and Products:

    a. BASF; Sonneborn, SL-2.
    b. Pecora Corp.; Urexspan NR-200.
    c. Tremco; THC-900/901.
    d. Sika Chemical Corp.; Sikaflex 2c SL.

E. Type 4-Multipart Polyurethane, Nonsag, Immersible:

1. Polyurethane base, multi component, chemical curing; ASTM C920, Type M, Grade NS, Class 25.
2. Manufacturers and Products:

a. Pecora; DynaTrol II.
b. Tremco; Dymeric 240.
c. BASF; Sonneborn NP-2.
d. Sika Chemical Corp.; Sikaflex 2c NS.

F. Type 5-One-part Polyurethane, Immersible:

1. Polyurethane base, single-component, moisture curing; ASTM C920, Type S, Grade NS or P, Class 25.
2. Capable of being continuously immersed in water.
3. Manufacturers and Products for Non-sag:

a. Sika Chemical Corp.; Sikaflex-la.
b. Tremco; Vulkem 116.

4. Manufacturers and Products for Self-leveling:

a. BASF; Sonneborn, SL-I.
b. Tremco; Vulkem 45.
c. Sika Chemical Corp.; Sikaflex Ic SL.
d. two-part.

G. Type 8-0ne-Part Polysulfide, Non-sag, Non-immersible:

1. Polysulfide base, single-component, moisture curing; ASTM C920, Type S, Grade NS, Class 12-1/2.
2. Capable of withstanding movement up to 20 percent of joint width.
3. Manufacturer and Product: W. R. Meadows; Deck-O-Seal, one-part.

H. Type 10 Sanitary Sealant:

1. Silicone sealant similar to Type I, above, formulated to resist mold growth and repeated exposure to high humidity while retaining adhesion, flexibility, and color.

2. Manufacturers and Products:

a. Dow Corning; 786.
b. General Electric; Sanitary Sealant SCS 1700.

I. Type 11-Fire Penetration Seal:

1. Manufacturers and Products:

a. 3M Corp.; Fire Barrier Caulk CP25 and Putty 303.
b. General Electric; Pensil Sealant or Foam.
c. Unifrax Corporation; Fyre Putty.
d. Hilti USA; CP 604.

J. Type 12-One-Part Polycarbonate, Immersible:

1. Polycarbonate base, single-component, moisture curing; ASTM C920, Type S, Grade NS, Class 25.

2. Capable of being continuously immersed in water.
3. Manufacturer and Product: Pro-Seal Products, Inc.; Pro-Seal 34.

K. Type 13-Tape Sealant:

1. Compressible polyurethane foam impregnated with polybutylene or polymer-modified asphalt.
2. Color: Black.
3. Size: 3/4-inch-wide by length required by expanded thickness recommended by manufacturer for particular application.
4. Manufacturers and Products:

   a. Emseal Joint Systems, Ltd.; AST-High Acrylic.
   b. Dayton Superior; Polytite Standard.
   c. PARR Technologies; PARR Sealant EP-7212-T.

2.02 BACKUP MATERIAL

A. Non-gassing, extruded, closed-cell round polyurethane foam or polyethylene foam rod, compatible with sealant used, and as recommended by sealant manufacturer.

B. Size: As shown or as recommended by sealant material manufacturer. Provide for joints greater than 3/16 inch wide.

C. Manufacturers and Products:

1. Sonneborn; Sonolastic Closed-cell Backing Rod.
2. Tremco; Closed-cell Backing Rod.
3. Pecora Corporation; Green Rod.

2.03 ANCILLARY MATERIALS

A. Bond Breaker: Pressure sensitive tape as recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Noncorrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Primer: Non-staining type recommended by sealant manufacturer to suit application.

2.04 PREFORMED SEALS

A. Preformed Compressible Joint Seals:

1. Widths Up to 5 Inches:

   a. BASF, Watson Bowman Acme Div.; Wabo Weatherseal II.

b. Emseal Joint Systems Limited; Colorseal.
c. LymTal International; Iso-flex Joint System.

2. Other Widths: Series or model recommended by seal manufacturer.

PART 3 – EXECUTION

3.01 GENERAL

A. Use of more than one material for the same joint is not allowed unless approved by sealant manufacturer.

B. Install joint sealants in accordance with ASTM C1193.

C. Horizontal and Sloping Joints up to 1 Percent Maximum Slope: Use self-leveling (Grade P) joint sealant.

D. Steeper Sloped Joints, Vertical Joints, and Overhead Joints: Use non-sag (Grade NS) joint sealant.

E. Use joint sealant as required for the applicable application and as follows:

Joint Size	Sealant Type
Less than 1"	1, 2, 3, 4, 5, 6, 7, 8, 9,10, or 12
Less than 2"	1, 2, 3, 4, or 7
Over 2"	Follow manufacturer's recommendation

3.02 PREPARATION

A. Verify that joint dimensions, and physical and environmental conditions, are acceptable to receive sealant.

B. Surfaces to be sealed shall be clean, dry, sound, and free of dust, loose mortar, oil, and other foreign materials.

1. Mask adjacent surfaces where necessary to maintain neat edge.
2. Starting of work will be construed as acceptance of sub-surfaces.
3. Apply primer to dry surfaces as recommended by sealant manufacturer.

C. Verify joint shaping materials and release tapes are compatible with sealant.

D. Examine joint dimensions and size materials to achieve required width/depth ratios.

E. Follow manufacturer's instructions for mixing multi-component products.

3.03 INSTALLATION

A. Use joint filler to achieve required joint depths, to allow sealants to perform intended function.

1. Install backup material as recommended by sealant manufacturer.
2. Where possible, provide full length sections without splices; minimize number of splices.
3. Tape sealant may be used as joint filler if approved by sealant manufacturer.

B. Use bond breaker where recommended by sealant manufacturer.

C. Seal joints around window, door and louver frames, expansion joints, control joints, and elsewhere as indicated.

D. Joint Sealant Materials: Follow manufacturer's recommendation and instructions, filling joint completely from back to top, without voids.

E. Joints: Tool slightly concave after sealant is installed.

1. When tooling white or light color sealant, use water wet tool.
2. Finish joints free of air pockets, foreign embedded matter, ridges, and sags.

F. Tape Sealant: Compress to 50 percent of expanded thickness and install in accordance with manufacturer's instructions.

3.04 PREFORMED SEALS

A. Prepare joint surfaces clean and dry, free from oil, rust, laitance, and other foreign material.

B. Construct joints straight and parallel to each other and at proper width and depth.

C. Apply joint sealant manufacturer's approved primer and adhesive in accordance with manufacturer's instructions.

D. Install seal in accordance with manufacturer's instructions.

3.05 CLEANING

A. Clean surfaces next to the sealed joints of smears or other soiling resultant of sealing application.

B. Replace damaged surfaces resulting from joint sealing or cleaning activities.

3.06 JOINT SEALANT SCHEDULE

A. This schedule lists the sealant types acceptable for each joint location. Use as few different sealant types as possible to meet the requirements of Project.

Joint Locations	Sealant Type(s)
Expansion/Contraction and Control Joints At:	
Concrete Walls (except water-holding) and below-grade portions of structures	1, 5, 12
Concrete Floor Slabs (except for water-holding Structures	2, 5
Slabs Subject to Vehicle and Pedestrian Traffic	2, 5
Masonry Walls	1, 4, 5, 12, 13
Exterior Insulation and Finish System	4
Ceramic Tile Floors	1, 2, 5, 10
Ceramic Tile Walls	1, 5, 10
Pre-cast Concrete Wall Panels	4, 5, 12, 13
Materials Joint At:	
Metal Door, Window, and Louver Frames (Exterior)	1, 5, 8, 12
Metal Door, Window, and Louver Frames (Interior)	1, 5, 8
Wall Penetrations (Exterior)	1, 5, 8, 12
Wall Penetrations (Interior)	1, 5, 6, 8
Floor Penetrations	5
Ceiling Penetrations	1, 4, 5
Roof Penetrations	5
Sheet Metal Flashings	5, 13
Sheet Metal Roofing and Siding	5, 13
Glazed Concrete Masonry Unit Joints	1
Other Joints	
Threshold Sealant Bed	5
Between Counter Tops and Backsplashes	10
Around Plumbing Fixtures	10
Opening Around Pipes, Conduits, and Ducts Through Fire-Rated Construction	11
Concrete Form Snap-Tie Holes	1, 4, 5

END OF SECTION

INDEX TO

SECTION 08 11 13 – HOLLOW METAL DOORS AND FRAMES

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Steel doors.
2. Steel door frames.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

C. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

1.4 QUALITY ASSURANCE

A. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.

1. Test Pressure: After 5 minutes into the test, the neutral pressure level in the furnace shall be established at 40 inches or less above the sill.

1.5 DELIVERY, STORAGE, AND HANDLING

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

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

C. Store doors and frames at building site under cover. Place units on minimum 4-inch- high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors to permit air circulation.

PART 2 – PRODUCTS

2.1 MATERIALS

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

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

C. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

2.2 DOORS

A. General: Provide doors of sizes, thicknesses, and designs indicated.

B. Interior Doors: Face sheets fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior door requirements. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless).

2.3 FRAMES

A. General: Provide steel frames for doors, sidelights, borrowed lights, and other openings that comply with ANSI A250.8 and with details indicated for type and profile.

B. Interior Frames: Fabricated from cold-rolled steel sheet, shop primed.

1. Fabricate knocked-down frames with mitered or coped corners, for field assembly.
2. Frames for Wood and Steel Doors: 0.053-inch- thick steel sheet, unless otherwise indicated.

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

D. Supports and Anchors: Fabricated from not less than 0.042-inch- thick, electrolytic zinc-coated or metallic-coated steel sheet.

1. Wall Anchors in Masonry Construction: 0.177-inch-diameter, steel wire complying with ASTM A 510 may be used in place of steel sheet.

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

2.4 ACCESSORIES

A. Louvers: Provide louvers for interior doors, where indicated, which comply with SDI 111C, with blades or baffles formed of 0.020-inch- thick, cold-rolled steel sheet set into 0.032-inch- thick steel frame.

1. Sight proof Louver: Stationary louvers constructed with inverted-V or inverted-Y blades.

2.5 FABRICATION

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

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

C. Clearances for Non-Fire-Rated Doors: Not more than 1/8 inch at jambs and heads, except not more than 1/4 inch between pairs of doors. Not more than 3/4 inch at bottom.

D. Clearances for Fire-Rated Doors: As required by NFPA 80.

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

F. Fabricate concealed stiffeners, reinforcement, edge channels, and moldings from either cold- or hot-rolled steel sheet.

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

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

I. Frame Construction: Fabricate frames to shape shown.

1. For exterior applications, fabricate frames with mitered or coped and continuously welded corners and seamless face joints.
2. For interior applications, fabricate knock-down frames with mitered or coped corners, for field assembly.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:

1) Two anchors per jamb up to 60 inches high.
2) Three anchors per jamb from 60 to 90 inches high.
3) Four anchors per jamb from 90 to 120 inches high.

b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

1) Three anchors per jamb up to 60 inches high.
2) Four anchors per jamb from 60 to 90 inches high.
3) Five anchors per jamb from 90 to 96 inches high.

c. Compression Type: Not less than two anchors in each frame.
d. Post installed Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

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

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

2.6 FINISHES

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

PART 3 – EXECUTION

3.1 INSTALLATION

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

B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Field apply bituminous coating to backs of frames that will be filled with grout containing anti-freezing agents.

2. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
4. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
5. In-Place Concrete or Masonry Construction: Secure frames in place with post installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
6. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on line 90 degrees from jamb perpendicular to frame head.

b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumb-ness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
c. At Bottom of Door: 3/4 inch plus or minus 1/32 inch.
d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

3.2 ADJUSTING AND CLEANING

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

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

END OF SECTION

INDEX TO

SECTION 08 16 13 – FIBERGLASS DOORS AND FRAMES

SECTION 08 16 13

FIBERGLASS DOORS AND FRAMES

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Fiberglass doors and frames.

1.2 REFERENCES

A. American Architectural Manufacturer Association (AAMA)

1. AAMA 1304; Voluntary Specification for Forced Entry Resistance of Side-Hinged Door Systems.

B. ASTM International

1. ASTM E283; Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
2. ASTM E330; Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Pressure Difference
3. ASTM E331; Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
4. ASTM E547; Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference
5. ASTM E 1886; Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials
6. ASTM E 1996; Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes

1.3 DESIGN REQUIREMENTS

A. Structural Requirements – Provide doors and frames capable of complying with requirements indicated:

1. Design pressure: As indicated on drawings

B. Impact (Windborne-Debris) Resistance

1. Doors and frames capable of resisting impact from windborne debris, when tested in accordance with ASTM E1886 and ASTM E1996.

1.4 SUBMITTALS

A. Product Data: Submit door manufacturer current product literature, including installation instruction.

B. Samples: Provide finish samples for all products.

C. Quality Assurance Submittals

1. Design Data: Provide manufacturer test report numbers indicating product compliance with indicated requirements.
2. Manufacturer Instructions: Provide manufacturer's written installation instructions.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver doors, frames, materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Store doors and frames as recommended by manufacturer.

1.6 WARRANTY

A. Manufacturer standard warranty indicating that doors and frames will be free from material and workmanship defects from the date of substantial completion for the time periods indicated below:

1. Fiberglass Doors and Frames: 3 Years.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or Architect approved comparable manufacturer:

1. Tiger Door, FRP Extreme Duty - Hurricane
2. Chem-Pruf, Hurricane / FBC Certified Door
3. Special Lite, SL-20 or SL-17

B. Door Style: Smooth, flush fiberglass doors.

2.2 MATERIALS

A. Stiles and Rails: Engineered wood (laminated veneer lumber), composite capped.

2.3 FIBERGLASS DOORS

A. Thickness: 1-3/4 inch.
B. Door Style: Solid.
C. Door Shape: Squared Top.

C. Finish: Field painted.

D. Hardware: As provided by Section 08 71 00.

2.4 FIBERGLASS FRAMES

A. Non-Rated Construction: One-piece pultruded fiberglass reinforced plastic, minimum 1/4 inch wall thickness, jamb-to-head joints mitered and reinforced with FRP clips and stainless steel fasteners; conforming to SDI requirements for performance equivalent to 16 gage steel frames or Stainless Steel hollow metal frames.

B. Frame Profile and Size: As indicated on Drawings.

C. Hardware Preparation: Mortise for lock strike, and recess for strike plate in lock jamb. Reinforce for hinges and other indicated hardware.

2.5 CONSTRUCTION ACCESSORIES

A. Sealants

1. Refer to Section 07 92 00 Joint Sealants.
2. Provide manufacturer recommended sealants maintain watertight conditions.

2.6 FABRICATION

A. Skins are adhered to engineered wood frames with core materials and bonding agents that permanently lock skin to frame.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify openings are ready to receive work and opening dimensions and clearances are as indicated on approved shop drawings. Do not begin installation until openings have been properly prepared.

B. If opening preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Acclimate doors and frames to site conditions for a minimum of 24 hours before installation.

3.2 INSTALLATION

A. Install door opening assemblies in accordance with approved shop drawings, SDI 100, and manufacturer's printed installation instructions, using installation methods and materials specified in installation instructions.

B. Site Tolerances: Maintain plumb and level tolerances specified in manufacturer's printed installation instructions.

D. Hardware: For installation, see Division 08 Section "Door Hardware."

3.3 ADJUSTING

A. Adjust doors in accordance with door manufacturer's maintenance instructions to swing open and shut without binding, and to remain in place at any angle without being moved by gravitational influence.

B. Adjust door hardware to operate correctly in accordance with hardware manufacturer's maintenance instructions.

C. Operation: Rehang or replace doors that do not swing or operate freely.

3.4 PROTECTION

A. Protect installed doors from damage.

END OF SECTION

INDEX TO

SECTION 08 33 23 – OVERHEAD COILING ALUMINUM DOORS

SECTION 08 33 23 - OVERHEAD COILING ALUMINUM DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Contractor to provide two aluminum overhead doors as specified herein and on plans for the MBR auxiliary building and two for the sludge dewatering building.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance, Exterior Doors: Exterior overhead coiling doors shall withstand the wind loads, the effects of gravity loads, and loads and stresses within limits and under conditions indicated.

1. Wind Loads: As indicated on Drawings

1.3 SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Show locations of replaceable fusible links.
3. Wiring Diagrams: For power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified.

D. Maintenance Data.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 - PRODUCTS

2.1 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.

B. Bottom Bar for Service Doors: Consisting of two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch (38 by 38 by 3 mm) thick; fabricated from metal to match curtain slats and finish.

C. Curtain Jamb Guides: Manufacturer's standard aluminum angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

1. Removable Posts and Jamb Guides for Counter Doors: Manufacturer's standard.

2.2 HOOD

A. General: Form sheet metal aluminum hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

2.3 LOCKING DEVICES

A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: Provide cylinders for locking mechanism on each door.
2. Keys: Provide three for each cylinder.

B. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.4 CURTAIN ACCESSORIES

A. Weather Seals: Equip each exterior door with weather-stripping gaskets fitted to entire perimeter of door for a weathertight installation, unless otherwise indicated.

B. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door. Provide pull-down straps or pole hooks for doors more than 84 inches (2130 mm) high.

2.5 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Brackets: Manufacturer's standard mounting brackets with 3/16 thick S.S. plates with permanently sealed ball bearings.

2.6 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement

specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

1. Comply with NFPA 70.
2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 11 Section "Common Motor Requirements for Equipment" unless otherwise indicated.

1. Electrical Characteristics:

   a. Phase: single phase.
   b. Volts: 115/230 V.
   c. Hertz: 60.

2. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. (203 mm/s) and not more than 12 in./sec. (305 mm/s), without exceeding nameplate ratings or service factor.
4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.

D. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening.

1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.

E. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."

1. Interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

F. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lb./f.

G. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from

floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

H. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

I. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with regulatory requirements for accessibility.

2.7 DOOR ASSEMBLY

A. Basis of Design for Coiling Doors: The doors are based on Overhead Door Corporation 620 Series door.

B. Service Door: Overhead coiling door formed with curtain of interlocking metal slats.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Cookson Company.
b. Overhead Door Corporation.
c. Raynor.
d. Wayne-Dalton Corp.
e. Windsor Door.

C. Operation Cycles: Not less than 20,000

D. Door Curtain Material: Aluminum

E. Door Curtain Slats: Flat profile slats of 2-5/8-inch nominal center-to-center height.

F. Door Curtain Slat Gauge: Minimum 14 Gauge Aluminum

G. Curtain Jamb Guides: Aluminum with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.

H. Hood: Match curtain material and finish.

1. Shape: Square.
2. Mounting: Face of wall.

I. Electric Door Operator:

1. Usage Classification: Standard duty, up to 60 cycles per hour.
2. Motor Exposure: Interior.
3. Emergency Manual Operation: Chain type.
4. Obstruction-Detection Device: Automatic photoelectric sensor.
5. Remote-Control Station: Interior

J. Door Finish:
   1. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion. Lubricate bearings and sliding parts as recommended by manufacturer. Adjust seals to provide weathertight fit around entire perimeter.

3.2 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION

INDEX TO

SECTION 08 54 13 – FIBERGLASS WINDOWS

SECTION 08 54 13

FIBERGLASS WINDOWS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes fixed fiberglass faced windows.

1.3 PREINSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review, discuss, and coordinate the interrelationship of windows with other exterior wall components. Include provisions for anchoring, flashing, weeping, sealing perimeters, and protecting finishes.
3. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
4. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.4 SUBMITTALS

A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, finishes, and operating instructions for each type of window indicated.

B. Shop Drawings: Include plans, elevations, sections, details, attachments to other Work, operational clearances, and the following:

1. Mullion details, including reinforcement and stiffeners.
2. Joinery details.
3. Flashing and drainage details.
4. Glazing details.

C. Samples for Verification: For window components required, prepared on Samples of size indicated below.

1. Main Framing Member: 12-inch- long, full-size sections of extrusions with factory-applied color finish.

D. Product Test Reports: Based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency, for each type, grade, and size of window. Test results based on use of down-sized test units will not be accepted.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An installer acceptable to window manufacturer for installation of units required for this Project.

B. Glazing Publications: Comply with published recommendations of glass manufacturers and GANA's "Glazing Manual" unless more stringent requirements are indicated.

C. Window Installation Publications: Comply with FMA/WDMA 250-10 "Standard Practice for the Installation of Non-Frontal Flange Windows with Mounting Flanges for Surface Barrier Masonry Construction for Extreme Wind / Water Conditions."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace windows that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.
b. Structural failures including excessive deflection, water leakage, and air infiltration.
c. Faulty operation of movable sash and hardware.
d. Deterioration of materials and finishes beyond normal weathering.
e. Failure of insulating glass.

2. Warranty Period:

a. Window: 10 years from date of Substantial Completion.
b. Glazing Units: 10 years from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Fiberglass Faced Windows:

a. Andersen Windows Inc. – Series A Coastal Stormwatch (Basis-of-Design)
b. Pella Corporation.

2.2 WINDOW PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Window Certification: WDMA certified with label attached to each window.

B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:

1. Minimum Performance Class: LC.
2. Minimum Performance Grade: 70.

C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.29 Btu/sq. ft. x h x deg F.

D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.28.

E. Sound Transmission Class (STC): Rated for not less than 34 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.

F. Outside-Inside Transmission Class (OITC): Rated for not less than 31 OITC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.

G. Windborne-Debris Resistance: Capable of resisting impact from windborne debris based on testing glazed windows identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996 and requirements of authorities having jurisdiction.

2.3 FIBERGLASS WINDOWS

A. Operating Types: Provide the following operating types in locations indicated on Drawings:

1. Fixed; non-frontal flange type with mounting flanges.

B. Frames and Sashes: Fine-grained wood lumber complying with AAMA/WDMA/CSA 101/I.S.2/A440; kiln dried to a moisture content of not more than 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch deep by 2 inches wide; water-repellent preservative treated.

1. Exterior Finish: Fiberglass composite.

a. Color: As selected by Architect from manufacturer's full range.

2. Interior Finish: Manufacturer's standard color-coated finish.

a. Color: White.

C. Windborne-Debris-Impact-Resistant Insulating-Glass Units: ASTM E 2190 with two lites and complying with impact-resistance requirements in "Window Performance Requirements" Article.

1. Exterior Lite: ASTM C 1036, Type 1, Class 1, q3; clear; heat strengthened.
2. Interior Lite: ASTM C 1172 clear laminated glass with two plies of float glass.

a. Float Glass: As required by performance requirements indicated.
b. Interlayer Thickness: As required by performance requirements indicated.

3. Filling: Fill space between glass lites with argon.
4. Low-E Coating: Sputtered on second surface.

D. Exterior Trim and Casing: Where indicated on Drawings, provide fiberglass composite trim in sizes indicated.

1. Color: Match window framing.

E. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 FABRICATION

A. Fabricate windows in sizes indicated. Include a complete system for installing and anchoring windows.

B. Glaze windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units.

E. Complete fabrication, assembly, finishing, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

F. Glazing Impact-Resistant Units: Factory glaze with high performance glazing sealant as primary seal and removable interior stops. Backfill between glass edge and frame with high performance sealant. Apply high performance glazing sealant as secondary seal at glass opening perimeter

1. Color of Secondary Sealant: Match window unit.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances; rough opening dimensions; levelness of sill plate; coordination with wall flashings, vapor retarders, and other built-in components; and other conditions affecting performance of work.

1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for installing windows, accessories, and other components; Drawings; and Shop Drawings.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Services: Testing and inspecting of representative areas to determine compliance of installed systems with specified requirements shall take place as follows and in successive stages as indicated on Drawings. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.

1. Water Spray Test: Before installation of interior finishes has begun, windows designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.

C. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.

3.4 PROTECTION AND CLEANING

A. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

INDEX TO

SECTION 08 71 00 – DOOR HARDWARE

SECTION 08 71 00

DOOR HARDWARE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Commercial door hardware.
2. Cylinders for doors specified in other Sections.

B. Related Sections include the following:

1. Section 08 16 13 "Fiberglass Doors & Frames"

1.3 SUBMITTALS

A. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.

C. Warranty: Special warranty specified in this Section.

D. Other Action Submittals:

1. Door Hardware Sets: Prepared by or under the supervision of Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

a. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule." Double space entries, and number and date each page.
b. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
c. Content: Include the following information:

1) Identification number, location, hand, fire rating, and material of each door and frame.

2) Type, style, function, size, quantity, and finish of each door hardware item.
3) Complete designations of every item required for each door or opening including name and manufacturer.
4) Fastenings and other pertinent information.
5) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
6) Explanation of abbreviations, symbols, and codes contained in schedule.
7) Mounting locations for door hardware.
8) Door and frame sizes and materials.

d. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets.

e. Submittal Sequence: Submit initial draft of final schedule along with essential Product Data to facilitate the fabrication of other work that is critical in Project construction schedule. Submit the final door hardware sets after Samples, Product Data, coordination with Shop Drawings of other work, delivery schedules, and similar information has been completed and accepted.

2. Keying Schedule: Prepared by or under the supervision of Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

1.4 QUALITY ASSURANCE

A. Architectural Hardware Consultant Qualifications: A person who is currently certified by DHI as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

B. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UBC Standard 7-2.

1. Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches or less above the sill.

D. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Section 01 33 00 "Submittal Procedures".

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

D. Deliver keys to Owner in person, by registered mail or overnight package service.

1. Keys can be turned over to the Contractor under written direction from the owner only.

1.6 COORDINATION

A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including excessive deflection, cracking, or breakage.
b. Faulty operation of operators and door hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: One years from date of Substantial Completion, except as follows:

a. Manual Closers: 10 years from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 – PRODUCTS

2.1 HINGES, GENERAL

A. Quantity: Provide the following, unless otherwise indicated:

1. Two Hinges: For doors with heights up to 60 inches.
2. Three Hinges: For doors with heights 61 to 90 inches.
3. Four Hinges: For doors with heights 91 to 120 inches.
4. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

B. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

C. Hinge Base Metal: Unless otherwise indicated, provide the following:

1. Interior Hinges: Steel, with steel pin.
2. Hinges for Fire-Rated Assemblies: Steel, with steel pin.

D. Hinge Options: Where indicated in door hardware sets or on Drawings:

1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for out swinging exterior doors.

E. Fasteners: Comply with the following:

1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
2. Wood Screws: For wood doors and frames.
3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
4. Screws: Phillips flat-head; Finish screw heads to match surface of hinges.

2.2 LOCKS AND LATCHES, GENERAL

A. Accessibility Requirements: Comply with ANSI A117.1.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.

B. Latches and Locks for Means of Egress Doors: Comply with NFPA 101. Latches shall not require more than 15 lbf to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

C. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Bored Locks: Minimum 1/2-inch latchbolt throw.

2. Deadbolts: Minimum 1-inch bolt throw.

D. Backset: 2-3/4 inches, unless otherwise indicated.

E. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, and as follows:

1. Strikes for Bored Locks and Latches: BHMA A156.2.
2. Strikes for Auxiliary Deadlocks: BHMA A156.5.
3. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.

2.3 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: Function numbers and descriptions indicated in door hardware sets comply with the following:

1. Bored Locks: BHMA A156.2.

B. Bored Locks: BHMA A156.2 Grade 1; Series 4000.

2.4 AUXILIARY LOCKS AND LATCHES

A. Auxiliary Locks: BHMA A156.5 Grade 1 unless Grade 2 is indicated.

2.5 DOOR BOLTS

A. Bolt Throw: Comply with testing requirements for length of bolts required for labeled fire doors.

1. Flush Bolt Heads: Minimum of 1/2-inch- diameter rods of brass, bronze, or stainless steel with minimum 12-inch- long rod for doors up to 84 inches in height. Provide longer rods as necessary for doors exceeding 84 inches.

B. Manual Flush Bolts: BHMA A156.16 Grade 1 designed for mortising into door edge.

C. Automatic and Self-Latching Flush Bolts: BHMA A156.3 Grade 1; designed for mortising into door edge.

2.6 LOCK CYLINDERS

A. Standard Lock Cylinders: BHMA A156.5, Grade 1 unless Grade 2 is indicated.

B. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:

1. Number of Pins: Six.
2. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.

3. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
4. Bored-Lock Type: Cylinders with tailpieces to suit locks.
5. All cylinders to match existing keyway.

C. Construction Keying: Comply with the following:

1. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

2.7 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference, and as follows:

1. Master Key System: Cylinders are operated by a change key and a master key.
2. Grand Master Key System: Cylinders are operated by a change key, a master key, and a grand master key.

B. Keys: Nickel silver.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

a. Notation: "DO NOT DUPLICATE" and Keyset number.

2. Quantity: In addition to one extra key blank for each lock, provide the following:

a. Cylinder Change Keys: Three.
b. Master Keys: Five.
c. Grand Master Keys: Five.

2.8 CLOSERS

A. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with ANSI A117.1.

1. Comply with the following maximum opening-force requirements:

a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

B. Door Closers for Means of Egress Doors: Comply with NFPA 101. Door closers shall not require more than 30 lbf to set door in motion and not more than 15 lbf to open door to minimum required width.

C. Power-Assist Closers: Not specified

D. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

E. Surface Closers: BHMA A156.4 Grade 1 Provide type of arm required for closer to be located on non-public side of door, unless otherwise indicated.

F. Coordinators: BHMA A156.3.

2.9 PROTECTIVE TRIM UNITS

A. Size: 1-1/2 inches less than door width on push side and 1/2 inch less than door width on pull side, by height specified in door hardware sets.

B. Fasteners: Manufacturer's standard machine or self-tapping screws.

C. Metal Protective Trim Units: BHMA A156.6; beveled top and 2 sides; fabricated from material indicated in door hardware sets.

1. Material: 0.050-inch- thick stainless steel.

2.10 STOPS AND HOLDERS

A. Stops and Bumpers: BHMA A156.16 Grade 1 unless Grade 2 is indicated.

1. Provide floor stops for doors unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic. Where floor or wall stops are not appropriate, provide overhead holders.

B. Silencers for Metal Door Frames: BHMA A156.16, Grade 1; neoprene or rubber, minimum diameter 1/2 inch; fabricated for drilled-in application to frame.

2.11 DOOR GASKETING

A. Standard: BHMA A156.22.

B. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

C. Fire-Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UBC Standard 7-2.

1. Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches or less above the sill.

D. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

E. Gasketing Materials: ASTM D 2000 and AAMA 701/702.

2.12 THRESHOLDS

A. Standard: BHMA A156.21.

B. Accessibility Requirements: Where thresholds are indicated to comply with accessibility requirements, comply with ANSI A117.1.

1. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than [1/2 inch high.

C. Thresholds for Means of Egress Doors: Comply with NFPA 101. Maximum 1/2 inch high.

2.13 MISCELLANEOUS DOOR HARDWARE

A. Auxiliary Hardware: BHMA A156.16, Grade 1 unless Grade 2 is indicated.

2.14 FABRICATION

A. Manufacturer's Nameplate: Do not provide manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise approved by Architect.

1. Manufacturer's identification will be permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18 for finishes. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for

application intended. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Steel Machine or Wood Screws: For the following fire-rated applications:

    a. Mortise hinges to doors.
    b. Strike plates to frames.
    c. Closers to doors and frames.

2. Steel Through Bolts: For the following fire-rated applications, unless door blocking is provided:

    a. Surface hinges to doors.
    b. Closers to doors and frames.
    c. Surface-mounted exit devices.

4. Spacers or Sex Bolts: For through bolting of hollow metal doors.
5. Fasteners for Wood Doors: Comply with requirements of DHI WDHS.2, "Recommended Fasteners for Wood Doors."

2.15 FINISHES

A. Standard: Comply with BHMA A156.18.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. BHMA Designations: Comply with base material and finish requirements indicated by the following:

1. BHMA 619: Satin nickel plated, clear coated, over brass or bronze base metal.
2. BHMA 626: Satin chromium plated over nickel, over brass or bronze base metal.
3. BHMA 627: Satin aluminum, clear coated, over aluminum base metal.
4. BHMA 628: Satin aluminum, clear anodized, over aluminum base metal.
5. BHMA 630: Satin stainless steel, over stainless-steel base metal.
6. BHMA 652: Satin chromium plated over nickel, over steel base metal.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Steel Frames: Comply with DHI A115 series.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 07 Section 07 92 00 "Joint Sealants."

3.4 FIELD QUALITY CONTROL

A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

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

1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
2. Door Closers: Adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

B. Six-Month Adjustment: Approximately six months after date of Substantial Completion, Installer shall perform the following:

1. Examine and readjust each item of door hardware as necessary to ensure function of doors and door hardware.
2. Consult with and instruct Owner's personnel on recommended maintenance procedures.
3. Replace door hardware items that have deteriorated or failed due to faulty design, materials, or installation of door hardware units.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

END OF SECTION
Attachment: Finish Hardware Schedule

Finish Hardware Schedule

(ALL Hardware for ALL Doors shall be corrosion resistant)

Based on:

Hinge	IVES (IVES)
Lockset	Best Locks
Privacy Set	Best Locks
Door Closer	LCN Closers (LCN)
Wall Bumper	IVES (IVES)
Weather-stripping	Pemko (PEM)
Sweep Strip	Pemko (PEM)
Threshold	Pemko (PEM)
Drip Cap	Pemko (PEM)
Misc.	Lowcountry D&H (LDH)
Silencer	IVES (IVES)

Hardware Finishes:

Finish	Finish Description
626	Satin chromium plated over nickel
630	Satin stainless steel
A	Aluminum
AL	Aluminum
C	
GRY	
US32D	Stain stainless steel

Door List

Door#	Hardware Set#
D102	2
C-D103	2
D101	1
D102	1
D103	3
D104	2
D105	3
D106	2
D201	2
D202	2
D203	2
D204	5
D205	4

Hardware Set#: 1

Key Set	Qty	Units	Door#	Door Location	Hand	Label	Deg
	1	Single	D101		N/A		
	1	Single	D102		N/A		
	2	Single	Size: X X 1 3/4				

Qty	UOM	Manf	Item Type	Item Series/Description	Finish
2	EA	LDH	Misc	All Hardware by Door Supplier	

Hardware Set#: 2

Key Set	Qty	Units	Door#	Door Location	Hand	Label	Deg
	1	Single	D102		N/A		
	1	Single	D103		N/A		
	1	Single	D104		N/A		
	1	Single	D106		N/A		
	1	Single	D201		N/A		
	1	Single	D202		N/A		
	1	Single	D203		N/A		
	7	Single	Size: X X 1 3/4				

Qty	UOM	Manf	Item Type	Item Series/Description	Finish
21	EA	IVES	Hinge	5BB1 x 4.5 X 4.5 x NRP	630

7 EA	SCH	Lockset	ND80PD x SPA x 13-047 x 10-025 ND80PD - Storeroom	626
7 EA	LCN	Door Closer	4040XP x SCUSH x TBWMS	AL
7 EA	PEM	Weatherstripping	303AS x 42" x 84"	A
7 EA	PEM	Sweep Strip	315CN x 42"w [Gray Insert]	C
7 EA	PEM	Threshold	2005AV x 42"w	A
7 EA	PEM	Drip Cap	346C x 46"w	C

Hardware Set#: 3

Key Set	Qty	Units	Door#	Door Location	Hand	Label	Deg
	1	Single	D103		N/A		
	1	Single	D105		N/A		
	2	Single	Size:	X X 1 3/4			

Qty	UOM	Manf	Item Type	Item Series/Description	Finish
6	EA	IVES	Hinge	5BB1 x 4.5 X 4.5 x NRP	630
2	EA	SCH	Lockset	ND80PD x SPA x 13-047 x 10-025 ND80PD - Storeroom	626
2	EA	LCN	Door Closer	4040XP x REG x TBWMS	AL
2	EA	PEM	Weatherstripping	303AS x 36" x 84"	A
2	EA	PEM	Sweep Strip	315CN x 36"w [Gray Insert]	C
2	EA	PEM	Threshold	2005AV x 36"w	A
2	EA	PEM	Drip Cap	346C x 40"w	C

Hardware Set#: 4

Key Set	Qty	Units	Door#	Door Location	Hand	Label	Deg
	1	Single	D205		N/A		
	1	Single	Size:	X X 1 3/4			

Qty	UOM	Manf	Item Type	Item Series/Description	Finish
3	EA	IVES	Hinge	5BB1 x 4.5 X 4.5 x NRP	630

1 EA	SCH	Lockset	ND80PD x SPA x 13-047 x 10-025 ND80PD - Storeroom	626
1 EA	LCN	Door Closer	4040XP x REG x TBWMS	AL
1 EA	PEM	Weatherstripping	303AS x 36" x 84"	A
1 EA	PEM	Sweep Strip	315CN x 36"w [Gray Insert]	C
1 EA	PEM	Threshold	2005AV x 36"w	A

Hardware Set#: 5

Key Set	Qty	Units	Door#	Door Location	Hand	Label	Deg
	1	Single	D204		N/A		
	1	Single	Size:	X X 1 3/4			

Qty	UOM	Manf	Item Type	Item Series/Description	Finish
3	EA	IVES	Hinge	5BB1 x 4.5 X 4.5	630
1	EA	SCH	Privacy Set	ND40S x SPA x 13-048 x 10-025	626
1	EA	IVES	Wall Bumper	WS407-CCV	US32D
3	EA	IVES	Silencer	SR64	GRY

INDEX TO

SECTION 08 80 00 – GLAZING

SECTION 08 80 00

GLAZING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes glazing for:

1. Doors.

B. Related Sections:

1. Division 08 Section "Fiberglass Doors and Frames" for glazed exterior doors.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind loads without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

a. Specified Design Wind Loads: As indicated on Drawings.
b. Maximum Lateral Deflection: For the following types of glass supported on all 4 edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch, whichever is less.

1) For insulating glass.

c. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

C. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

D. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

B. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Glazing Manual."
2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F.

1.8 WARRANTY

A. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.

D. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes enhanced-protection testing requirements in ASTM E 1996 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.

1. Small-Missile Test: For glazing located more than 30 feet above grade.
2. Large-Missile Test: For all glazing, regardless of height above grade.

E. Uniform Wind Load Capacity: Design, size and install components to withstand positive and negative wind loading pressures in accordance with International Building Code, as determined by Structural Engineer.

2.2 LAMINATED GLASS

A. Windborne-Debris-Impact-Resistant Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, with "Windborne-Debris-Impact Resistance" Paragraph in "Glass Products, General" Article, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written recommendations.
2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

2.3 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
2. Spacer: Manufacturer's standard spacer material and construction.
3. Desiccant: Molecular sieve or silica gel, or blend of both.

B. Glass: Comply with applicable requirements in "Glass Products" Article and in "Laminated Glass" Article as indicated by designations in "Insulating-Glass Types" Article and in "Insulating-Laminated-Glass Types" Article.

2.4 GLAZING ACCESSORIES

A. Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other glazing accessories that are compatible with glazing products and each other.

B. Glazing Sealants: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Dow Corning Corporation.
   b. GE Construction Sealants; Momentive Performance Materials Inc.
   c. Tremco Incorporated.

2. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

C. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

D. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.5 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

E. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

F. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

G. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.6 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine framing glazing, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 LAMINATED GLASS SCHEDULE

A. Windborne-Debris-Impact-Resistant Laminated Glass at 1st Floor Exterior Doors: Clear laminated glass with two plies of heat strengthened float glass.

1. Minimum Thickness of Each Glass Ply: 6 mm.
2. Interlayer Thickness: 0.060 inch.

3.9 INSULATING-GLASS SCHEDULE

A. Clear, Windborne-Debris-Impact Resistant Insulating-Glass Units at 2nd Floor Exterior Doors:

1. Description: Dual-seal impact-resistant insulating glass.
2. Overall Unit Thickness: 1 inch
3. Outdoor Lite: (2) laminated lites of heat-strengthened (HS) float glass, ASTM C 1036, Type 1, Class 1, Quality q3; clear.
4. Interspace Content: Air, hermetically sealed, dehydrated space.
5. Indoor Lite: Heat-strengthened (HS) float glass; ASTM C 1036, Type 1, Class 1, Quality q3; clear.
6. Interlayer Material: Polyvinyl Butyral (PVB) or SGP
7. Interlayer Color: Clear

END OF SECTION

INDEX TO

SECTION 08 83 00 – MIRRORS

SECTION 08 83 00

MIRRORS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following types of silvered flat glass mirrors.

1. Mirrors.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Mirrors. Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.

B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachments to other work.

C. Samples: For each type of the following products:

1. Mirrors: 12 inches square, including edge treatment on two adjoining edges.
2. Mirror Clips: Full size.
3. Mirror Trim: 12 inches long.

D. Product Certificates: For each type of mirror and mirror mastic, from manufacturer.

E. Maintenance Data: For mirrors to include in maintenance manuals.

F. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

B. Source Limitations for Mirrors: Obtain mirrors from single source from single manufacturer.

C. Source Limitations for Mirror Accessories: Obtain mirror glazing accessories from single source.

D. Glazing Publications: Comply with the following published recommendations:

1. GANA's "Glazing Manual" unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.
2. GANA Mirror Division's "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."

E. Safety Glazing Products: For film-backed mirrors, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.

G. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing film and substrates on which mirrors are installed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which mirror manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide mirrors by one of the following:

1. Arch Aluminum & Glass Co., Inc.
2. Binswanger Mirror.
3. Guardian Industries Corp.
4. Independent Mirror Industries, Inc.
5. Lenoir Mirror Company.
6. Stroupe Mirror Co., Inc.
7. Sunshine Mirror.
8. Virginia Mirror Company, Inc.
9. Walker Glass Co., Ltd.

2.2 SILVERED FLAT GLASS MIRROR MATERIALS

A. Clear Glass Mirrors: ASTM C 1503, Mirror Select Quality.

1. Nominal Thickness: 6.0 mm.

2.3 MISCELLANEOUS MATERIALS

A. Setting Blocks: Elastomeric material with a Type A Shore durometer hardness of 85, plus or minus 5.

B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.

C. Mirror Mastic: An adhesive setting compound, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Gunther Mirror Mastics.
b. Palmer Products Corporation.

2.4 MIRROR HARDWARE

A. Top and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.

1. Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively, and a thickness of not less than 0.05 inch.

a. Products: Subject to compliance with requirements, provide one of the following:

1) Laurence, C. R. Co., Inc.; CRL Standard "J" Channel.
2) Sommer & Maca Industries, Inc.; Aluminum Shallow Nose "J" Moulding Lower Bar.
3) Sommer & Maca Industries, Inc.; Heavy Gauge Aluminum Shallow Nose "J" Moulding Lower Bar.

2. Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch in height, respectively, and a thickness of not less than 0.062 inch.

a. Products: Subject to compliance with requirements, provide one of the following:

1) Laurence, C. R. Co., Inc.; CRL Deep "J" Channel.
2) Sommer & Maca Industries, Inc.; Aluminum Deep Nose "J" Moulding Upper Bar.
3) Sommer & Maca Industries, Inc.; Heavy Gauge Aluminum Deep Nose "J" Moulding Lower Bar.

3. Finish: Clear bright anodized.

B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.5 FABRICATION

A. Mirror Sizes: To suit Project conditions, and before tempering, cut mirrors to final sizes and shapes.

B. Cutouts: Fabricate cutouts before tempering for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.

C. Mirror Edge Treatment: Rounded polished edge.

1. Seal edges of mirrors after edge treatment to prevent chemical or atmospheric penetration of glass coating.

2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance.
   1. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.
   2. Proceed with mirror installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating surfaces with mastic manufacturer's special bond coating where applicable.

3.3 INSTALLATION

A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.

B. Provide a minimum air space of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.

C. Wall-Mounted Mirrors: Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.

   1. Top and Bottom Aluminum J-Channels: Provide setting blocks 1/8 inch thick by 4 inches long at quarter points. To prevent trapping water, provide, between setting blocks, two slotted weeps not less than 1/4 inch wide by 3/8 inch long at bottom channel.
   2. Install mastic as follows:

      a. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.

3.4 CLEANING AND PROTECTION

A. Protect mirrors from breakage and contaminating substances resulting from construction operations.

B. Do not permit edges of mirrors to be exposed to standing water.

C. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

D. Wash exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash mirrors as recommended in writing by mirror manufacturer.

END OF SECTION

INDEX TO

SECTION 09 22 16 – NON–STRUCTURAL METAL FRAMING

SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes non-load-bearing steel framing members for the following applications:

1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

PART 2 - PRODUCTS

2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized, unless otherwise indicated.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Steel Framing and Furring:

a. Steel Stud Manufacturers' Association members.
b. Dietrich UltraSTEEL™ Framing.

2.2 SUSPENSION SYSTEM COMPONENTS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch- diameter wire.

B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.

C. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch- wide flanges.

1. Depth: 2 inches, unless otherwise indicated.

D. Furring Channels (Furring Members):

1. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
   a. Minimum Base Metal Thickness: 0.0179 inch.

E. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Runners: ASTM C 645.

1. Minimum Base-Metal Thickness: 0.027 inch (25 gauge or equivalent), or greater as required to comply with manufacturer's requirements for limiting heights and applied loads.
2. Depth: As indicated on Drawings.

B. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
2. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
   a. Products: Subject to compliance with requirements, provide one of the following:
      1) Steel Network Inc. (The); VertiClip SLD Series.
      2) Superior Metal Trim; Superior Flex Track System (SFT).

C. Flat Strap and Backing Plate: Steel sheet for blocking and bracing at all loctions where wall-mounted accessories are shown and at Owner-installed visual display board locations.

1. Minimum Base-Metal Thickness: 0.0312 inch.

D. Cold-Rolled Channel Bridging: 0.0538-inch bare-steel thickness, with minimum 1/2-inch-wide flanges.

1. Depth: 1-1/2 inches, unless indicated otherwise.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.

E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base Metal Thickness: 0.0179 inch.
2. Depth: 7/8 inch.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Install sealer gaskets to isolate the underside of wall bottom track and the top of slab-on-grade at stud locations.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 INSTALLING FRAMED ASSEMBLIES

A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

B. Install studs so flanges within framing system point in same direction.

1. Space studs as follows: 16 inches o.c., unless otherwise indicated.

C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
    a. Install two studs at each jamb, unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

D. Direct Furring:

1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

E. Z-Shaped Furring Members:

1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION

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SECTION 09 29 00 – GYPSUM BOARD

SECTION 09 29 00

GYPSUM BOARD

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Interior gypsum board.
2. Sound dampening board.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

1.4 STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 – PRODUCTS

2.1 INTERIOR GYPSUM BOARD

A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. G-P Gypsum.
   b. Lafarge North America Inc.
   c. National Gypsum Company.
   d. USG Corporation.

B. Type X:

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

C. Moisture- and Mold-Resistant Type: ASTM C1177/C 1177M. Non-combustible, moisture- and mold-resistant gypsum core with coated fiberglass mat facings.

1. Thickness: 5/8-inch thick.
2. Long Edges: Tapered.
3. Products: Subject to compliance with requirements, provide one of the following:

   a. G-P Gypsum Company; DensArmor Plus Abuse Guard Interior Drywall.
   b. United States Gypsum Co.; FIBEROCK Brand Aqua-Tough Gypsum Panels.

2.2 SOUND DAMPENING MATERIALS

A. Sound Deadening Board: Glass faced gypsum board with sound-absorbing viscoelastic polymer core.

1. Product: Subject to compliance with requirements, provide the following:

   a. "QuietRock 528" by Serious Energy.

2. Thickness: 5/8 inch thick.
3. Tolerance: +/- 0.650-0.715".
4. STC Rating: 50-58 (ASTM E90).
5. Water Absorption: < 5% of weight (ASTM C630, ASTM C1396, ASTM C1658).
6. Mold Resistance: 10, in a test as manufactured (ASTM D3273).
7. Size: 48 by 96 inches.

2.3 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.
   1. Material: Paper-faced galvanized steel sheet.
   2. Shapes:
      a. Cornerbead.
      b. LC-Bead: J-shaped; exposed long flange receives joint compound.
      c. Expansion (control) joint.

2.4 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:
   1. Interior Gypsum Wallboard: Paper.
   2. Glass-Mat Faced Gypsum Board: 10-by-10 glass mesh.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
   1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
   2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
   3. Fill Coat: For second coat, use drying-type, all-purpose compound.
   4. Finish Coat: For third coat, use drying-type, all-purpose compound.

D. Joint Compound for Glass-Mat Faced Gypsum Board Applications:
   1. Glass-Mat Gypsum Board: As recommended by board manufacturer.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
   1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

D. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."

E. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

C. Locate edge and end joints over supports. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

D. Form control and expansion joints with space between edges of adjoining gypsum panels.

E. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

F. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Type X: Vertical surfaces, unless otherwise indicated.
2. Glass-Mat Interior Type: At Bathrooms.
3. Sound Dampening Materials: Where indicated on Drawings.

B. Single-Layer Application:

1. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated, and minimize end joints.
   a. Stagger abutting end joints not less than one framing member in alternate courses of panels.

2. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners, unless otherwise indicated.
2. LC-Bead: Use at exposed panel edges.

3.5 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.

3.6 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

INDEX TO

SECTION 09 30 00 – TILING

SECTION 09 30 00

TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Interior wall and floor tile.

B. Related Sections:

1. Section 09 29 00 "Gypsum Board" for moisture- and mold-resistant gypsum board substrate.

1.3 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on floor surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:

1. Level Surfaces: Minimum 0.6.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.

D. Product Certificates: For each type of product, signed by product manufacturer.

E. Material Test Reports: For each tile-setting and -grouting product.

1.5 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain all tile of same type from one source or producer.

1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.

D. Store liquid latexes in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting and Grouting Materials" Article.

C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:

1. As selected by Architect from manufacturer's full range.

2.2 TILE PRODUCTS

A. Porcelain Floor Tile: Flat tile, as follows:

1. Composition: Porcelain.
2. Module Size: As selected by Architect.
3. Face: Plain with square or cushion edges.

B. Wall Tile: Flat tiles, as follows:

1. Module Size: As selected by Architect.
2. Face: Plain with modified square edges or cushion edges.
3. Finish: As selected by Architect.

C. Wall Tile Trim Units: Matching characteristics of adjoining flat tile and coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes as selected by Architect.

1. Wainscot Cap: Surface bullnose, module size same as adjoining flat tile.
2. External Corners: Surface bullnose, module size same as adjoining flat tile.
3. Internal Corners: Field-butted square corners.

D. Accessories: Provide vitreous china accessories of type and size indicated, suitable for installing by same method as used for adjoining wall tile.

1. One soap holder for each shower and tub indicated.
2. Color and Finish: Match adjoining wall tile.

2.3 SETTING AND GROUTING MATERIALS

A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.1A.

B. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.

C. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

D. High-Performance Tile Grout: ANSI A118.7.

2.4 MISCELLANEOUS MATERIALS

A. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.5 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units

taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.

E. Grout tile to comply with requirements of the following tile installation standards:

1. For ceramic tile grout (latex-portland cement), comply with ANSI A108.10.

3.4 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.5 TILE INSTALLATION SCHEDULE

A. Interior Wall Installations:

1. Tile Installation W243: Thin-set mortar on gypsum board; TCA W243.

   a. Tile Type: As selected by Architect.
   b. Thin-Set Mortar: Latex- portland cement mortar.
   c. Grout: High-performance unsanded grout.

END OF SECTION

INDEX TO

SECTION 09 51 13 – ACOUSTICAL PANEL CEILINGS

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes acoustical panels and exposed suspension systems for ceilings.

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.

1. Acoustical Panel: Set of 6-inch- square Samples of each type, color, pattern, and texture.

2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch-long Samples of each type, finish, and color.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.

D. Maintenance Data: For finishes to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:

1. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:

C. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:

1. International Building Code, 1621.1, and applicable requirements of ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9.6.

2. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies--Seismic Zones 3 & 4."

D. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.7 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 ACOUSTICAL PANELS, GENERAL

A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance, unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.

B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.2 MINERAL-BASE ACOUSTICAL PANELS:

A. Manufacturers:

1. Armstrong World Industries; "Dune" Item No. 1772 (Basis of Design).

2. USG Corporation.

B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:

1. Type and Form: Type III, mineral base with painted finish; Form 2.

2. Pattern: CE.

C. Color: White.

D. Edge Detail: Square.

E. Thickness: 5/8 inch.

F. Size: 24 by 24 inches.

G. LR: Not less than 0.80.

H. NRC: Not less than 0.50.

I. Fire Rating: Class A.

2.3 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.

D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

2. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.

3. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- diameter wire.

E. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

F. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

G. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.

H. Hold-Down Clips: At Exterior Drive-through, provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees.

2.4 METAL SUSPENSION SYSTEM:

A. Manufacturers:

1. Armstrong World Industries, Inc.; "Prelude XL 15/16" Exposed Tee System" (Basis of Design)

2. USG Corporation.

B. Wide-Face, Capped, Double-Web, Hot-Dip Galvanized-Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet hot-dip galvanized according to ASTM A 653/A 653M, with prefinished 15/16-inch- wide metal caps on flanges.

1. Structural Classification: Heavy-duty system.

2. Face Design: Flush face.

3. Cap Finish: Painted white.

2.5 METAL EDGE MOLDINGS AND TRIM

A. Manufacturers:

1. Armstrong World Industries, Inc.

2. Chicago Metallic Corporation.

3. USG Interiors, Inc.

B. Roll-Formed Sheet-Metal Edge Moldings and Trim: Provide perimeter trim, designed to fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

C. Beam End Retaining Clips: As approved by authority having jurisdiction, provide beam end retaining clips for perimeter attachment of suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

1. ACM7 by USG.

2. BERC-2 by Armstrong.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION, GENERAL

A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

1. Standards for Ceiling Suspension Systems Requiring Seismic Restraint:

a. CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies-Seismic Zones 3 & 4."
b. IBC, 1621.1, and applicable requirements of ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9.6.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.

2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.

6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post installed mechanical

or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.

7. Do not attach hangers to steel roof deck. Attach hangers to structural members.

8. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post installed anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet . Miter corners accurately and connect securely.

2. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

INDEX TO

SECTION 09 65 13 – RESILITENT BASE AND ACCESSORIES

SECTION 09 65 13

RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Resilient base.

B. Related Sections:

1. 09 30 00 Tilling

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC-RUBBER BASE

A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products by **Johnsonite, Inc.** or Architect approved comparable product.

B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).

1. Group: I (solid, homogeneous).
2. Style: Style B, Cove.

C. Thickness: 0.125 inch.

D. Height: As indicated on Drawings.

E. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard length.

F. Corners: Preformed.

G. Colors: As selected by Architect from full range of industry colors.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION

INDEX TO

SECTION 09 90 00 – PAINTING AND PROTECTIVE COATINGS

SECTION 09 90 00

PAINTING AND PROTECTIVE COATINGS

PART 1 – GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Water Works Association (AWWA):
   a. C203, Coal–Tar Protective Coatings and Linings for Steel Water Pipelines–Enamel and Tape–Hot–Applied.
   b. C209, Cold–Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
   c. C213, Fusion–Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.
   d. C214, Tape Coating Systems for the Exterior of Steel Water Pipelines.
2. Environmental Protection Agency (EPA).
3. NACE International (NACE): RP0188, Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.
4. NSF International (NSF): 61, Drinking Water System Components Health Effects.
5. Occupational Safety and Health Act (OSHA).
6. The Society for Protective Coatings (SSPC):
   a. P A 2, Measurement of Dry Coating Thickness with Magnetic Gages.
   b. P A 3, Guide to Safety in Paint Applications.
   c. SP 1, Solvent Cleaning.
   d. SP 2, Hand Tool Cleaning.
   e. SP 3, Power Tool Cleaning.
   f. SP 5, White Metal Blast Cleaning.
   g. SP 6, Commercial Blast Cleaning.
   h. SP 7, Joint Surface Preparation Standard Brush–Off Blast Cleaning.
   i. SP 10, Near–White Blast Cleaning.
   j. SP 11, Power Tool Cleaning to Bare Metal.

k. SP 12, Surface Preparation and Cleaning of Metals Water Jetting Prior to Recoating.

l. SP 13, Surface Preparation of Concrete.

m. Guide 15, Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates.

7. Master Painters Institute (MPI)

1.02 DEFINITIONS

A. Terms used in this section:

1. Coverage: Total minimum dry film thickness in mils or square feet per gallon.
2. FRP: Fiberglass Reinforced Plastic.
3. HCl: Hydrochloric Acid.
4. MDFT: Minimum Dry Film Thickness, mils.
5. Mil: Thousandth of an inch.
6. PDS: Product Data Sheet.
7. PSDS: Paint System Data Sheet.
8. PVC: Polyvinyl Chloride.
9. SFPG: Square Feet per Gallon.
10. SFPGPC: Square Feet per Gallon per Coat.
11. SP: Surface Preparation.

1.03 SUBMITTALS

A. Action Submittals:

1. Data Sheets:

a. For each product, furnish a Product Data Sheet (PDS), the manufacturer's technical data sheets, and paint colors available (where applicable). The PDS form is appended to the end of this section.

b. For each paint system, furnish a Paint System Data Sheet (PSDS). The PSDS form is appended to the end of this section.

c. Technical and performance information that demonstrates compliance with Specification.

d. Furnish copies of paint system submittals to the coating applicator.

e. Indiscriminate submittal of only manufacturer's literature is not acceptable.

f. Provide a cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

g. Printout of current "MPI Approved Products List" with the proposed product highlighted for those products specified in paragraph "Architectural Paint Systems and Application Schedule" herein (Section 3.12).

2. Detailed chemical and gradation analysis for each proposed abrasive material.

3. Paint Color Schedule: List of paint colors selected (manufacturer, name and number) and corresponding locations of application.

4. Samples:

a. Reference Panel:

1) Paint & Coatings:

(a) Unless otherwise specified, before painting work is started, prepare samples as required in "Mockup" herein.

(b) Furnish additional samples as required until colors, finishes, and textures are approved.

(c) Approved samples to be the quality standard for final finishes.

B. Informational Submittals:

1. Applicator's Qualification: List of references substantiating experience.

2. Coating manufacturer's Certificate of Compliance, in accordance with Section 01 00 01, General Requirements.

3. Factory Applied Coatings: Manufacturer's certification stating factory applied coating system meets or exceeds requirements specified.

4. Manufacturer's written verification that submitted material is suitable for the intended use and is compatible with any other products applied to the same surface.

5. Manufacturer's written instructions and special details for applying each type of paint and coating.

1.04 QUALITY ASSURANCE

A. Applicator Qualifications: Minimum 5 years' experience in application of specified products.

B. Regulatory Requirements:

1. Meet federal, state, and local requirements limiting the emission of volatile organic compounds (VOC).

2. Perform surface preparation and painting in accordance with recommendations of the following:

a. Paint manufacturer's instructions.

b. SSPC P A 3, Guide to Safety in Paint Applications.

c. Federal, state, and local agencies having jurisdiction.

C. MPI Standards for Architectural Paint Systems:

1. Products listed in paragraph "Architectural Paint Systems and Application Schedule" (Section 3.12) shall comply with MPI Standards indicated and listed in current "MPI approved Products List".

2. Preparation and workmanship of products listed in paragraph "Architectural Paint Systems and Application Schedule" shall comply with requirements in "MPI Architectural Painting Specification Manual".

D. Mockup:

1. Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

2. Unless noted otherwise, prepare minimum 8–inch by 10–inch sample with type of paint and/or coating and application specified on similar substrate to which paint and/or coating is to be applied.

a. Wall Surfaces: Provide samples on at least 100 sq. ft. of wall surface.

b. Doors: Provide full size samples for interior and exterior doors.

3. If preliminary color selections are not approved, additional benchmark samples of additional colors selected by Architect shall be provided by the Contractor at no added cost to Owner.

4. Final approval of color selections will be based on benchmark samples which shall serve as the quality standard for final finishes.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:

a. Product name or title of material.
b. Product description (generic classification or binder type).
c. Manufacturer's stock number and date of manufacture.
d. Contents by volume, for pigment and vehicle constituents.
e. Thinning instructions.
f. Application instructions.
g. Color name and number.

B. Shipping:

1. Where precoated items are to be shipped to the Site, protect coating from damage. Batten coated items to prevent abrasion.
2. Protect shop painted surfaces during shipment and handling by suitable provisions including padding, blocking, and use of canvas or nylon slings.
3. Contractor shall repair damages that have occurred during transit, to the satisfaction of the Owner, or shall supply a replacement.

C. Storage:

1. Store products in a protected area that is heated or cooled to maintain temperatures within the range recommended by paint manufacturer.
2. Primed surfaces shall not be exposed to weather for more than 2 months before being top coated, or less time if recommended by coating manufacturer.

1.06 PROJECT CONDITIONS

A. Environmental Requirements:

1. Do not apply paint in temperatures or moisture conditions outside of manufacturer's recommended maximum or minimum allowable.
2. Do not perform final abrasive blast cleaning whenever relative humidity exceeds 85 percent, or whenever surface temperature is less than 5 degrees F above dew point of ambient air.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Nationally recognized manufacturers of paints and protective coatings who are regularly engaged in the production of such materials for essentially identical service conditions.

B. Minimum of 5 years' verifiable experience in manufacture of specified product.

C. Each of the following manufacturers is capable of supplying most of the paint products specified in paragraph "Architectural Paint Systems and Application Schedule" herein (Section 3.12):

1. Sherwin Williams.
2. Tnemec.
3. PPG Architectural Finishes.
4. Benjamin Moore & Co.
5. Rose Talbert Paints

D. Acceptable manufacturers of other paints and/or coatings are as specified in Section 3.

2.02 ABRASIVE MATERIALS

A. Select abrasive type and size to produce surface profile that meets coating manufacturer's recommendations for specific primer and coating system to be applied.

2.03 PAINT MATERIALS

A. General:

1. Manufacturer's highest quality products suitable for intended service.
2. Compatibility: Only compatible materials from a single manufacturer shall be used in the Work. Particular attention shall be directed to compatibility of primers and finish coats.
3. Thinners, Cleaners, Driers, and Other Additives: As recommended by coating manufacturer.

B. Products:

Product	Definition
Acrylic Latex	Single–component, finish as required.
Acrylic Latex (Flat)	Flat latex
Acrylic Sealer	Clear acrylic
Alkyd (Semigloss)	Semigloss alkyd
Alkyd Enamel	Optimum quality, gloss or semigloss finish as required, medium long oil.
Alkyd Wood Primer	Flat alkyd
Bituminous Paint	Single–component, coal–tar pitch based.
Block Filler	Primer–sealer designed for rough masonry surfaces, 100% acrylic emulsion.
Coal–Tar Epoxy	Amine, polyamide, or phenolic epoxy type 70% volume solids minimum, suitable for immersion service.
DTM Acrylic Primer	Surface tolerant, direct–to–metal water borne acrylic primer.
DTM Acrylic Finish	Surface tolerant, direct–to–metal water borne acrylic finish coat.
Elastomeric Polyurethane	100% solids, plural component, spray applied, high build, elastomeric polyurethane coating, suitable for the intended service.
Epoxy Filler/Surfacer	100% solids epoxy trowel grade filler and surfacer, nonshrinking, suitable for application to concrete and masonry. Approved for potable water contact and conforming to NSF 61, where required.
Epoxy Nonskid (Aggregated)	Polyamidoamine or amine converted epoxies

Product	Definition
	aggregated; aggregate may be packaged separately
Epoxy Primer–Ferrous Metal	Anticorrosive, converted epoxy primer containing rust–inhibitive pigments.
Epoxy Primer–Other	Epoxy primer, high–build, as recommended by coating manufacturer for specific galvanized metal, copper, or nonferrous metal alloy to be coated.
Fusion Bonded Coating	100% solids, thermosetting, fusion bonded, dry powder epoxy, suitable for the intended service.
Fusion Bonded, TFE Lube or Grease Lube	Tetrafluoroethylene, liquid coating, or open gear grease as supplied by McMaster–Carr Supply Corporation., Elmhurst, IL; RL 736 manufactured by Amrep, Inc., Marietta, GA.
High Build Epoxy	Polyamidoamine epoxy, minimum 69% volume solids, capability of 4 to 8 MDFT per coat.
High Solids Polyurethane	Two–component, low VOC, aliphatic, acrylic polyurethane resin coating having a minimum of 65% volume solids; high gloss or semi gloss finish
Inorganic Zinc Primer	Solvent or water based, having 85% metallic zinc content in the dry film; follow manufacturer's recommendation for top coating.
Latex Primer Sealer	Waterborne vinyl acrylic primer/sealer for interior gypsum board and plaster. Capable of providing uniform seal and suitable for use with specified finish coats.
NSF Epoxy	Polyamidoamine epoxy, approved for potable water contact and conforming to NSF 61
Epoxy, High Solids	Polyamidoamine epoxy, 80% volume solids, minimum, suitable for immersion service
Polyurethane Enamel	Two–component, aliphatic or acrylic based polyurethane; high gloss finish
Rust–Inhibitive Primer	Single–package steel primers with anticorrosive pigment loading
Sanding Sealer	Co–polymer oil, clear, dull luster.
Silicone/Silicone Acrylic	Elevated temperature silicone or silicone/acrylic based.

Product	Definition
Stain, Concrete	Acrylic, water repellant, penetrating stain.
Stain, Wood	Satin luster, linseed oil, solid or transparent as required.
Varnish	Non–pigmented vehicle based on a variety of resins (alkyd, phenolic, urethane) in gloss, semigloss, or flat finishes, as required.
Water Base Epoxy	Two–component, polyamide epoxy emulsion, finish as required.

2.04 MIXING

A. Multiple–Component Coatings:

1. Prepare using each component as packaged by paint manufacturer.
2. No partial batches will be permitted.
3. Do not use multiple–component coatings that have been mixed beyond their pot life.
4. Furnish small quantity kits for touchup painting and for painting other small areas.
5. Mix only components specified and furnished by paint manufacturer.
6. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

B. Colors: Formulate paints with colorants free of lead, lead compounds, or other materials that might be affected by presence of hydrogen sulfide or other gas likely to be present at Site.

2.05 SHOP FINISHES

A. Shop Blast Cleaning: Reference Paragraph, Shop Coating Requirements.

B. Surface Preparation: Provide Contractor minimum 7 days' advance notice to start of shop surface preparation work and coating application work.

C. Shop Coating Requirements:

1. When required by equipment Specifications, such equipment shall be primed, and finish coated in shop by manufacturer and touched up in field with identical material after installation.
2. Where manufacturer's standard coating is not suitable for intended service condition, Engineer may approve use of a tie–coat to be used between manufacturer's standard coating and specified field finish. In such cases, tie–coat shall be surface tolerant epoxy as recommended by manufacturer of specified field finish coat. Coordinate details of equipment manufacturer's standard coating with field coating manufacturer.

2.06 ARCHITECTURAL PRODUCTS

The following is to be applied to all paint systems except where specifically noted otherwise herein and on the Drawings.

A. Exterior Metal Primer: Primer, Epoxy, Anti-Corrosive, for Metal: MPI #101

B. Exterior Wood Primer: Primer, Alkyd for Exterior Wood: MPI #5.

C. Exterior Water-Based Paint: Light Industrial Coating, Exterior, Water Based, Gloss (Gloss Level 6): MPI #164.

D. Exterior Latex Paint: Exterior Latex (Semigloss) MPI #11 (Gloss Level 5).

E. Interior Primers / Sealers: Interior Latex Primer/Sealer MPI #50.

F. Interior Metal Primers:

   a. Quick-Drying Alkyd Metal Primer MPI #76.

   b. Waterborne Galvanized-Metal Primer: MPI #134.

G. Interior Latex Paints:

   a. Interior Latex (Eggshell) MPI #52 (Gloss Level 3).

   b. Interior Latex (Semigloss): MPI #54 (Gloss Level 5).

H. Epoxy Coatings: Epoxy-Modified Latex, Interior, Gloss (Gloss Level 6) MPI #115.

PART 3 – EXECUTION

3.01 GENERAL

A. Provide Contractor minimum 7 days' advance notice to start of field surface preparation work and coating application work.

B. Perform the Work only in presence of Contractor, unless Engineer grants prior approval to perform the Work in Contractor's absence.

C. Schedule inspection of cleaned surfaces and all coats prior to succeeding coat in advance with Contractor.

3.02 EXAMINATION

A. Factory Finished Items:

   1. Schedule inspection with Contractor before repairing damaged factory-finished items delivered to Site.

   2. Repair abraded or otherwise damaged areas on factory–finished items as recommended by coating manufacturer. Carefully blend repaired areas into original finish. If required to match colors, provide full finish coat in field.

B. Surface Preparation Verification: Inspect and provide substrate surfaces prepared in accordance with these Specifications and printed directions and recommendations of paint manufacturer whose product is to be applied. The more stringent requirements shall apply.

C. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent
2. Masonry: 12 percent
3. Wood: 15 percent
4. Gypsum Board: 12 percent

D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

E. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry. Commencement of coating application constitutes Contractor's acceptance of substrates and conditions.

3.03 PROTECTION OF ITEMS NOT TO BE PAINTED

A. Remove, mask, or otherwise protect hardware, lighting fixtures, switch plates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not specified elsewhere to be painted.

B. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces.

C. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process.

D. Mask openings in motors to prevent paint and other materials from entering.

E. Protect surfaces adjacent to or downwind of Work area from overspray.

3.04 SURFACE PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated in paragraph "Architectural Paint Systems and Application Schedule" (Section 3.12 herein).

B. Metal Surface Preparation:

1. Where indicated, meet requirements of SSPC Specifications summarized below:

a. SP 1, Solvent Cleaning: Removal of visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants by cleaning with solvent.

b. SP 2, Hand Tool Cleaning: Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, using nonpower hand tools.

c. SP 3, Power Tool Cleaning: Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, using power–assisted hand tools.

d. SP 5, White Metal Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter by blast cleaning.

e. SP 6, Commercial Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter, except for random staining limited to no more than 33 percent of each unit area of surface which may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.

f. SP 7, Brush–Off Blast Cleaning: Removal of visible rust, oil, grease, soil, dust, loose mill scale, loose rust, and loose coatings. Tightly adherent mill scale, rust, and coating may remain on surface.

g. SP 10, Near–White Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter, except for random staining limited to no more than 5 percent of each unit area of surface which may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.

h. SP 11, Power Tool Cleaning to Bare Metal: Removal of visible oil, grease, dirt, dust, mill scale, rust, paint, oxide, corrosion products, and other foreign matter using power–assisted hand tools capable of producing suitable surface profile. Slight residues of rust and paint may be left in lower portion of pits if original surface is pitted.

i. SP 12, Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating: Surface preparation using high–pressure and ultrahigh–pressure water jetting to achieve specified surface cleanliness condition. Surface cleanliness conditions are defined in SSPC SP 12 and are designated WJ–I through WJ–4 for visual surface preparation definitions and SC–I through SC–3 for nonvisual surface preparation definitions.

2. The words "solvent cleaning," "hand tool cleaning," "wire brushing," and "blast cleaning," or similar words of equal intent in these Specifications or in paint manufacturer's specification refer to the applicable SSPC Specification.

3. Where OSHA or EPA regulations preclude standard abrasive blast cleaning, wet or vacu–blast methods may be required. Coating manufacturers' recommendations for wet blast additives and first coat application shall apply.

4. Ductile Iron Pipe Supplied with Asphaltic Varnish Finish: Remove asphaltic varnish finish prior to performing specified surface preparation.

5. Hand tool clean areas that cannot be cleaned by power tool cleaning.

6. Round or chamfer sharp edges and grind smooth burrs, jagged edges, and surface defects.

7. Welds and Adjacent Areas:

   a. Prepare such that there is:

      1) No undercutting or reverse ridges on weld bead.

      2) No weld spatter on or adjacent to weld or any area to be painted.

      3) No sharp peaks or ridges along weld bead.

   b. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.

8. Preblast Cleaning Requirements:

   a. Remove oil, grease, welding fluxes, and other surface contaminants prior to blast cleaning.

   b. Cleaning Methods: Steam, open flame, hot water, or cold water with appropriate detergent additives followed with clean water rinsing.

   c. Clean small isolated areas as above or solvent clean with suitable solvent and clean cloth.

9. Blast Cleaning Requirements:

   a. Type of Equipment and Speed of Travel: Design to obtain specified degree of cleanliness. Minimum surface preparation is as specified herein and takes precedence over coating manufacturer's recommendations.

   b. Select type and size of abrasive to produce surface profile that meets coating manufacturer's recommendations for particular primer to be used.

   c. Use only dry blast cleaning methods.

   d. Do not reuse abrasive, except for designed recyclable systems.

   e. Meet applicable federal, state, and local air pollution and environmental control regulations for blast cleaning, confined space entry (if required), and disposition of spent aggregate and debris.

10. Post–Blast Cleaning and Other Cleaning Requirements:

   a. Clean surfaces of dust and residual particles from cleaning operations by dry (no oil or water vapor) air blast cleaning or other method prior to painting. Vacuum clean enclosed areas and

other areas where dust settling is a problem and wipe with a tack cloth.

b. Paint surfaces the same day they are blasted. Reblast surfaces that have started to rust before they are painted.

C. Galvanized Metal Surface Preparation:

1. Prepare in accordance with ASTM D 6386 and recommended procedures from the American Galvanizers Association (AGA).

2. Notify galvanizer that steel will be painted.

3. Newly Galvanized Metal (48 hours or less since galvanizing):

a. Grinding: removed excess zinc, remove dross particles, bumps, runs and drips by hand grinder. If process removes too much zinc, surface must be repaired in accordance with ASTM A780.
b. Ensure surface is free of oil, grease, dirt and other organic materials. If it is not, see Partially Weathered for cleaning procedure.
c. Rinse thoroughly and dry.
d. Profile by sweep blasting at a maximum pressure of 40 psi, wash primer or acrylic pre-treatment. Take care not to damage the galvanized coating.

4. Partially Weathered Metal (2 days – 12 months from galvanizing):

a. Grinding as previously defined for Newly Galvanized Metal.
b. Clean surface of organic compounds and wet storage stain using alkaline solution or solvent cleaning.
c. Rinse thoroughly and dry.
d. Profile as previously defined for Newly Galvanized Metal.

5. The pressure of cleaning or rinsing performed must not exceed 1450 psi.

6. Apply paint or coating within 12 hours of drying.

D. Nonferrous Metal Alloy Surface Preparation:

1. Remove soil, cement spatter, and other surface dirt with appropriate hand or power tools.

2. Remove oil and grease by wiping or scrubbing surface with suitable solvent, rag, and brush. Use clean solvent and clean rag for final wiping to avoid contaminating surface.

3. Obtain and follow coating manufacturer's recommendations for additional preparation that may be required.

E. Concrete Surface Preparation:

1. Do not begin until a minimum of 30 days after concrete has been placed, and longer if directed by product manufacturer.

2. Meet requirements of SSPC SP 13.

3. Adhere to manufacturer's recommendations for preparation of the concrete surface. Ensure surface is free from grease, oil, dirt, salts or other chemicals, loose materials, or other foreign matter.

4. Secure coating manufacturer's recommendations for additional preparation, if required, for excessive bug holes exposed after preparation.

5. Unless otherwise required for proper adhesion, ensure surfaces are dry prior to painting.

F. Plastic Surface Preparation:

1. Hand sand plastic surfaces to be coated with medium grit sandpaper to provide tooth for coating system.

2. Large areas may be power sanded or brush–off blasted, provided sufficient controls are employed so surface is roughened without removing excess material.

G. Masonry Surface Preparation:

1. Complete and cure masonry construction for 14 days or more before starting surface preparation work.

2. Remove oil, grease, dirt, salts or other chemicals, loose materials, or other foreign matter by solvent, detergent washing, or other suitable cleaning methods.

3. Clean masonry surfaces of mortar and grout spillage and other surface deposits using one of the following:

   a. Nonmetallic fiber brushes and commercial muriatic acid followed by rinsing with clean water.

   b. Brush–off blasting.

   c. Water blasting.

4. Do not damage masonry mortar joints or adjacent surfaces.

5. Leave surfaces clean and, unless otherwise required for proper adhesion, dry prior to painting.

6. Masonry Surfaces to be Painted: Uniform texture and free of surface imperfections that would impair intended finished appearance.

7. Masonry Surfaces to be Clear Coated: Free of discolorations and uniform in texture after cleaning.

H. Wood Surface Preparation:

1. Replace damaged wood surfaces or repair in a manner acceptable to Contractor prior to start of surface preparation.

2. Solvent clean (mineral spirits) knots and other resinous areas and coat with shellac or other knot sealer, prior to painting. Remove pitch by scraping and wipe clean with mineral spirits or turpentine prior to applying knot sealer.

3. Round sharp edges by light sanding prior to priming.

4. Filler:

a. Synthetic–based wood putty approved by paint manufacturer for paint system.

b. For natural finishes, color of wood putty shall match color of finished wood.

c. Fill holes, cracks, and other surface irregularities flush with surrounding surface and sand smooth.

d. Apply putty before or after prime coat, depending on compatibility and putty manufacturer's recommendations.

e. Use cellulose type putty for stained wood surfaces.

f. Ensure surfaces are clean and dry prior to painting.

I. Gypsum Board Surface Preparation: Typically, new gypsum board surfaces need no special preparation before painting.

1. Surface Finish: Dry, free of dust, dirt, powdery residue, grease, oil, or any other contaminants.

3.05 SURFACE CLEANING

A. Brush–off Blast Cleaning:

1. Equipment, procedure, and degree of cleaning shall meet requirements of SSPC SP 7.

2. Abrasive: Either wet or dry blasting sand, grit, or nutshell.

3. Select various surface preparation parameters, such as size and hardness of abrasive, nozzle size, air pressure, and nozzle distance from surface such that surface is cleaned without pitting, chipping, or other damage.

4. Verify parameter selection by blast cleaning a trial area that will not be exposed to view.

5. Engineer will review acceptable trial blast cleaned area and use area as a representative sample of surface preparation.

6. Repair or replace surface damaged by blast cleaning.

B. Solvent Cleaning:

1. Consists of removal of foreign matter such as oil, grease, soil, drawing and cutting compounds, and any other surface contaminants by using solvents, emulsions, cleaning compounds, steam cleaning, or similar materials and methods that involve a solvent or cleaning action.

2. Meet requirements of SSPC SP 1.

3.06 APPLICATION

A. General:

1. The intention of these Specifications is for new, interior and exterior masonry, concrete, and metal, surfaces to be painted, whether specifically mentioned or not, except as specified otherwise. Do not paint exterior concrete surfaces, unless specifically indicated.

2. Apply coatings and paint in accordance with these Specifications and manufacturers' printed recommendations and special details. The more stringent requirements shall apply. Allow sufficient time between coats to assure thorough drying of previously applied paint.

3. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.

4. Coat units or surfaces to be bolted together or joined closely to structures or to one another prior to assembly or installation.

5. Water–Resistant Gypsum Board: Use only solvent type paints and coatings.

6. On pipelines, terminate coatings along pipe runs to 1 inch inside pipe penetrations.

7. Keep paint materials sealed when not in use.

8. Where more than one coat is applied within a given system, alternate colors to provide a visual reference showing required number of coats have been applied.

B. Galvanized Metal, Copper, and Nonferrous Metal Alloys:

1. Concealed galvanized, copper, and nonferrous metal alloy surfaces (behind building panels or walls) do not require painting, unless specifically indicated herein.

2. Prepare surface and apply primer in accordance with System No. 10 specification.

3. Apply intermediate and finish coats of the coating system appropriate for the exposure.

C. Porous Surfaces, Such as Concrete and Masonry:

1. Repairs shall be completed using products specified in Section 03 30 00 Cast-In-Place Concrete.

2. Filler/Surface: Use coating manufacturer's recommended product to fill air holes, bug holes, and other surface voids or defects that may inhibit or prevent adequate application of coating.

3. Prime Coat: If it acceptable to the manufacturer, prime coat may be thinned to provide maximum penetration and adhesion. The reduction volume shall be determined by the manufacturer specific to the density and type of coating being applied. Reduction shall not be implemented if it voids the warranty of any product.

4. Surface Specified to Receive Water Base Coating: For most applications, surface shall be damp just prior to application of coating, but free of running water. Verify this requirement with manufacturer for specified product.

D. Film Thickness and Coverage:

1. Number of Coats:

a. Minimum required without regard to coating thickness.

b. Additional coats may be required to obtain minimum required paint thickness, depending on method of application, differences in manufacturers' products, and atmospheric conditions.

2. Application Thickness:

a. Do not exceed coating manufacturer's recommendations.

b. Measure using a wet film thickness gauge to ensure proper coating thickness during application.

3. Film Thickness Measurements and Electrical Inspection of Coated Surfaces:

a. Perform with properly calibrated instruments.

b. Recoat and repair as necessary for compliance with Specification.

c. Coats are subject to inspection by Contractor and coating manufacturer's representative.

4. Visually inspect concrete, masonry, nonferrous metal, plastic, and wood surfaces to ensure proper and complete coverage has been attained.

5. Give particular attention to edges, angles, flanges, and other similar areas, where insufficient film thicknesses are likely to be present, and ensure proper millage in these areas.

6. Apply additional coats as required to achieve complete hiding of underlying coats. Hiding shall be so complete that additional coats would not increase the hiding.

3.07 FIRE RATED ASSEMBLIES

A. Permanently identify corridor partitions, smoke stop partitions, horizontal exit partitions, exit enclosures and fire walls. Above decorative ceiling line and in concealed spaces, apply a minimum one-inch wide red line interrupted at maximum 15-ft spacing with the wording "XX HOUR FIRE AND SMOKE BARRIER - PROTECT ALL OPENINGS" in 4-inch high letters with "XX" designating the appropriate hourly rating.

3.08 FIELD QUALITY CONTROL

A. Owner reserves the right to invoke test procedure at any time and as often as Owner deems necessary during the period when paint is being applied.

1. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove noncomplying paint from Project site, pay for testing, and repaint surfaces previously coated with the noncomplying paint.

B. Testing:

Testing is to be performed on the waterproof and anti-corrosion coatings applied to the interior surfaces of the Basins.

1. Thickness and Continuity Testing:

a. Measure coating thickness specified in mils with a magnetic type, dry film thickness gauge, in accordance with SSPC P A 2. Check each coat for correct millage. Do not make measurement before a minimum of 8 hours after application of coating.

b. Holiday detect coatings 20 mils thick or less, except zinc primer and galvanizing, with low voltage wet sponge electrical holiday detector in accordance with NACE RP0188.

c. Holiday detect coatings in excess of 20 mils dry with high voltage spark tester as recommended by coating manufacturer and in accordance with NACE RP0188.

d. After repaired and recoated areas have dried sufficiently, retest each repaired area. Final tests may also be conducted by Engineer.

2. Testing Equipment:

a. Provide magnetic type dry film thickness gauge to test coating thickness specified in mils, as manufactured by Nordson Corp., Anaheim, CA, Mikrotest.

b. Provide low–voltage wet sponge electrical holiday detector to test completed coating systems, 20 mils dry film thickness or less, except zinc primer, high–build elastomeric coatings, and galvanizing, for pinholes, holidays, and discontinuities, as manufactured by Tinker and Rasor, San Gabriel, CA, Model M–I.

c. Provide high–voltage spark tester to test completed coating systems in excess of 20 mils dry film thickness. Unit as recommended by coating manufacturer.

C. Inspection: Leave staging and lighting in place until Engineer has inspected surface or coating. Replace staging removed prior to approval by Engineer. Provide additional staging and lighting as requested by Engineer.

D. Unsatisfactory Application:

1. If item has an improper finish color or insufficient film thickness, clean surface and topcoat with specified paint material to obtain specified color and coverage. Obtain specific surface preparation information from coating manufacturer.

2. Evidence of runs, bridges, shiners, laps, or other imperfections is cause for rejection.

3. Repair defects in accordance with written recommendations of coating manufacturer.

E. Damaged Coatings, Pinholes, and Holidays:

1. Feather edges and repair in accordance with recommendations of paint manufacturer.

2. Hand or power sand visible areas of chipped, peeled, or abraded paint, and feather the edges. Follow with primer and finish coat. Depending on extent of repair and appearance, a finish sanding and topcoat may be required.

3. Apply finish coats, including touchup and damage–repair coats in a manner that will present a uniform texture and color–matched appearance.

3.09 MANUFACTURER'S SERVICES

A. Coating manufacturer's representative shall be present at Site for the application of the waterproof and anti-corrosion coatings for the Basins as follows:

1. On first day of application of any coating system.

2. A minimum of two additional Site inspection visits, each for a minimum of 4 hours, in order to provide Manufacturer's Certificate of Proper Installation.

3. During thickness and continuity testing to verify conformance with project and manufacturer requirements.

4. As required to resolve field problems attributable to or associated with manufacturer's product.

5. To verify full cure of coating prior to coated surfaces being placed into immersion service.

3.10 CLEANUP

A. Place cloths and waste that might constitute a fire hazard in closed metal containers or destroy at end of each day.

B. Upon completion of the Work, remove staging, scaffolding, and containers from Site or destroy in a legal manner.

C. Remove paint spots, oil, or stains upon adjacent surfaces and floors and leave entire job clean.

3.11 PROTECTIVE COATINGS SYSTEMS AND APPLICATION SCHEDULE

A. Unless otherwise shown or specified, paint surfaces–in accordance with the following application schedule and the environmental types defined in Section 01 00 01, General Requirements. In the event of discrepancies or omissions in the following, request clarification from Engineer before starting work in question.

B. System No. 2 Submerged Metal:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 5, White Metal Blast Cleaning	Prime in accordance with manufacturer's recommendations	
	Coal–Tar Epoxy –OR– High Build Epoxy	2 coats, 16 MDFT 2 coats, 16 MDFT

1. Use on the following items or areas:

   a. New metal surfaces located in submerged environment type.
   b. New metal surfaces above maximum liquid surface that are a part of submerged equipment.
   c. Submerged surfaces of metallic items, such as wall pipes, pipes, pipe sleeves, access manholes, gates, gate guides, thimbles, and structural steel that are embedded in concrete.
   d. Interior surfaces of steel piping noted in the Piping Schedule.

C. System No. 4 Galvanized Metal, Corrosive:

Surface Prep.	Paint Material	Min. Coats, Cover
See Preparation section of this specification	Zinc-Rich Primer	1 coat, per mfr
	Top Coat – Acrylic Latex	1 coat, per mfr

1. Use on the following items or areas:

a. Exposed new galvanized metal surfaces located in interior equipment room

b. Exposed galvanized metal deck: exterior and interior.

c. Exposed galvanized structural steel, including beams and columns of monorail and porch framing.

d. Exposed galvanized steel stair and platform framing (exterior).

e. Galvanized steel lintels.

f. Galvanized exterior doors and frames.

D. System No. 5 Exposed Metal, Mildly Corrosive:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near–White Blast Cleaning	Epoxy Primer – Ferrous Metal	1 coat, 2.5 MDFT
	Polyethylene Enamel	1 coat, 3 MDFT

1. Use on the following items or areas:

a. Miscellaneous exposed new metal surfaces inside the 2nd level of the building.

b. Interior doors and frames.

E. System No. 6 Exposed Metal Atmospheric:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 6, Commercial Blast Cleaning	Rust Inhibitive Primer	1 coat, 2 MDFT
	Alkalyd Enamel	2 coats, 4 MDFT

1. Use on the following items or areas:

a. Exposed new metal surfaces including vents, exterior metal ductwork, flashing, sheet metalwork and miscellaneous architectural metal trim.

b. Apply surface preparation and primer to surfaces prior to installation. Finish coats need only be applied to surfaces exposed after completion of construction.

F. System No. 8 Buried Metal General:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near White Blast Cleaning	Coal–Tar Epoxy	2 coats, 125 microns each
	Coal-Tar Primer,	1 coat, per mfr

	Coal-Tar Enamel	2 coats hot applied per mfr

1. Use on the following items or areas:
   a. Buried, below grade portions of steel items, except buried stainless steel or ductile iron and the following specific surfaces:
      1) Fasteners and accessories of buried piping related items.

G. System No. 10 Nonferrous Metal Alloy Conditioning:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Nonferrous Metal Alloy Surface Preparation	Epoxy Primer–Other	As recommended by coating manufacturer Remaining coats as required for exposure

1. Use on the following items or areas:
   a. Aluminum handrail, grating, panels, and miscellaneous components both interior and exterior.
   b. After application of System No. 10, apply finish coats as required for exposure. For handrail apply per specifications herein. For other items apply per manufacturer recommendations.

H. System No. 11 Galvanized Metal Repair:

Surface Prep.	Paint Material	Min. Coats, Cover
Solvent Clean (SPI) Followed by Hand Tool (SP 2), Power Tool (SP 3) or Brush off Blast (SP 7)	Organic Zinc Rich Primer	1 coat, 3 MDFT

1. Use on the following items or areas:
   a. Galvanized surfaces that are abraded, chipped or otherwise damaged.

I. System No. 19 Concrete Tank Waterproof Coating:

Surface Prep.	Paint Material	Min. Coats, Wet Thickness
As specified by the manufacturer	CIM 61TN Epoxy Primer	2 coats, 5 mil (wet) – recoat w/in 48 hrs
	CIM 1000	2 coats, 60* mil (dry)

*Apply extra thickness at corners, intersections, angles and over joints.

1. Use on the following items or areas:

   a. Walls and base slab of EQ Tank, MBR tanks, MBT tank, Digester tanks, grit system concrete tank, and splitter box.

J. System No. 20 Concrete Tank Anti-Corrosion Coating:

Surface Prep.	Paint Material	Min. Coats, Dry Thickness
As specified by the Manufacturer	Raven 405 System	3 coats min, 60 mil

1. Use on the following items or areas:

   a. Top 4 ft. of Splitter Box, Anaerobic, Pre-Aeration Basins, Post Anoxic, and Membrane Basins walls.

   b. Top 6 ft. of pre-anoxic walls

   c. Underside of all concrete slabs and walkways over all Basins.

   d. Coating of all exposed piping inside of all basins.

   e. Headcell grit removal system. The horizontal surface (top of walls), the interior vertical surface to 1 foot below water line of concrete walls, interior walls of concrete trough to 1 foot below water line and top vertical surface.

   f. The entire slab below the Headwork and the equipment pedestals

K. System No. 21 Decorative Abrasion Resistant Concrete Finish:

Surface Prep.	Paint Material	Min. Coats, Cover
Shot blast concrete as specified by manufacturer	Stontec UTF, by Stonhard Inc.	As specified by manufacturer

1. Use on the following items or areas:
   a. Interior floors on 2nd floor of the building.

L. System No. 22 Decorative Abrasion Resistant Non-Slip Concrete Coating:

Surface Prep.	Paint Material	Min. Coats, Cover
Shot blast concrete as specified by manufacturer	Stontec UTF with White Texture, by Stonhard Inc.	As specified by manufacturer

2. Use on the following items or areas:
   a. Exterior concrete slab on 2nd level at top of stairs and at covered area between monorail bay and building CMU wall.

M. System No. 23 Chemical–Resistant Non-Slip Floor and Wall Coating:

Surface Prep.	Paint Material	Min. Coats, Cover
Shot blast concrete as specified by manufacturer	Stonchem 830, by Stonhard Inc.	As specified by manufacturer

3. Use on the following items or areas:
   a. Interior slab on grade and equipment slabs of the Equipment Room, sludge dewatering room and MCC Room.

b. Lower 6 inches of all walls in the first floor Equipment Room, caustic and Alum containment area and MCC Room.

N. System No. 25 Exposed PVC (where applicable):

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Plastic and FRP Surface Preparation	Acrylic Latex Semigloss	2 coats, 320 SFPGPC

1. Use on the following items or areas:
   a. All exterior, exposed–to–view PVC and CPVC surfaces.

O. System No. 27 Aluminum and Dissimilar Metal Insulation:

Surface Prep.	Paint Material	Min. Coats, Cover
Solvent Clean (SP 1)	Prime in accordance with manufacturer's recommendations	
	Bituminous Paint	1 coat, 10 MDFT

1. Use on aluminum surfaces embedded or in contact with concrete.

P. System No. 29 Fusion Bonded Coating:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near–White Blast Cleaning	Fusion Bonded Coating 100% Solids Epoxy	1 or 2 coats, 7 MDFT

1. For steel pipe and fittings, meet all requirements of AWWA C213.
2. Use on the following items:
   a. Interior and exterior of valves as specified in Section 40 27 02 Process Valves and Operators.

3.12 ARCHITECTURAL PAINT SYSTEMS AND APPLICATION SCHEDULE

A. Unless otherwise shown or specified, paint surfaces in accordance with the following application schedule. In the event of discrepancies or omissions in the following, request clarification from Engineer before starting work in question.

B. System No. 102 Wood, Exterior:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Wood Surface Preparation	Alkyd Wood Primer, MPI #5	1 coat
	Latex, exterior, matching topcoat	1 coat
	Latex, exterior gloss (Gloss Level 6), MPI #119	1 coat

1. Use on the following items or areas:
   a. All exterior wood.

C. System No. 1 06 Wood, Interior, Latex System: n/a

D. System No. 109 Masonry, Semigloss:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Masonry Surface Preparation	Block Filler	1 coat, 75 SFPG
	Acrylic Latex (Semigloss)	2 coats, 240 SFPGPC

1. Use on the following items or areas:
   a. All interior CMU walls in the first and 2nd floor of the MBR Building to include MCC room, auxiliary room, and stair room

E. System No. 112 Concrete, Flat:

Surface Prep.	Paint Material	Min. Coats, Cover

In accordance with Paragraph Concrete Surface Preparation	Acrylic Latex (Flat)	2 coats, 240 SFPGPC

1. Use on the following items or areas:
   a. Basin exterior walls. (only two walls looking South & West)
   b. Lower and upper walls of the building. (no paint needed on future Phase II tank side)

F. System No. 114 Gypsum Board, Latex System:

Surface Prep.	Paint Material	Min. Coats
In accordance with Paragraph Gypsum Board Surface preparation	Interior Latex Primer Sealer	1 coat
	Interior latex matching topcoat	1 coat
	Interior latex (eggshell)	1 coat

1. Use Latex System MPI INT 9.2A on the following items or areas:
   a. Interior gypsum board in dry areas.

G. System No. 115 Gypsum Board, Epoxy-Modified Latex System:

Surface Prep.	Paint Material	Min. Coats
In accordance with Paragraph Gypsum Board Surface preparation	Skim coat of joint compound	1 coat
	Primer sealer, latex, interior	1 coat
	Epoxy-modified latex, interior, gloss (Gloss Level 6)	2 coats

1. Use Epoxy-Modified Latex System MPI INT 9.2F on the following items or areas:
   a. Interior gypsum board in wet areas.

3.13 COLORS

A. Provide color chart to owner for color section.

B. Proprietary identification of colors is for identification only. Selected manufacturer may supply matches.

C. Equipment Colors:

1. Equipment includes the machinery or vessel itself plus the structural supports and fasteners and attached electrical conduits.

2. Paint equipment and piping one color as selected.

3. Paint non – submerged portions of equipment the same color as the piping it serves, except as itemized below:

a. Dangerous Parts of Equipment and Machinery: OSHA Orange.

b. Fire Protection Equipment and Apparatus: OSHA Red.

c. Physical hazards in normal operating area and energy lockout devices, including, but not limited to, electrical disconnects for equipment and equipment isolation valves in air and liquid lines under pressure: OSHA Yellow.

D. Pipe Identification Painting:

1. Color code non – submerged metal piping, except electrical conduit. Paint fittings and valves the same color as pipe, except equipment isolation valves.

2. Pipe Color Coding & Labling: As indicated in Piping Schedule at the bottom of spec.

3. Pipe Supports (for metals that are not galvanized steel, aluminum and stainless steel): Painted light gray, as approved by Engineer.

4. PVC and CPVC pipe located inside of buildings and enclosed structures will not require painting except as noted or scheduled.

3.14 SUPPLEMENTS

A. The supplements listed below, following "End of Section," are a part of this Specification:

1. Paint System Data Sheet (PSDS).

2. Product Data Sheet (PDS).

END OF SECTION

PAINT PRODUCT DATA SHEET

Complete and attach manufacturer's Technical Data Sheet to this PDS for each product submitted. Provide manufacturer's recommendations for the following parameters at temperature (F)/relative humidity:

Temperature/RH	50/50	70/30	90/25
Induction Time			
Pot Life			
Shelf Life			
Drying Time			
Curing Time			
Min. Recoat Time			
Max. Recoat Time			

Provide manufacturer's recommendations for the following:

Mixing Ratio:_____

Maximum Permissible Thinning: _____

Ambient Temperature Limitations: min.:_____ max: _____

Surface Temperature Limitations: min.:_____ max: _____

Surface Profile Requirements: min.:_____ max: _____

Attach additional sheets detailing manufacturer's recommended storage requirements and holiday testing procedures.

PAINT SYSTEM DATA SHEET

Complete this PDS for each coating system, include all components of the system (surface preparation, primer, intermediate coats, and finish coats). Include all components of a given coating system on a single PDS.

Paint System Number (from Spec):		
Paint System Title (from Spec):		
Coating Supplier:		
Representative:		
Surface Preparation:		
Paint Material (Generic)	**Product Name/Number (Proprietary)**	**Min. Coats, Coverage**

Wastewater Treatment Plant Color Coding Schedule

TYPE OF PIPE	USE OF PIPE	COLOR OF PIPE
Sludge Lines:	Raw Sludge	Brown w/ black bands
	Sludge recirculation or suction	Brown w/ yellow bands
	Sludge drw off	Brown w/ orange bands
	Sludge recirculation discharge	Brown
Gas Lines:	Sludge Gas	Orange (or Red)
	Natural Gas	Orange (or Red) w/ Black bands
Water Lines:	Non-potable Water	Blue w/ black bands
	Potable Water	Blue
	Water for heating digestors or buildings	Blue with a 6 in. (150mm) red band space 30 in. (760mm) apart
Other Lines:	Chlorine	Yellow
	Alum	Orange
	Caustic	Yellow with Green band
	Sewage (wastewater)	Gray
	Compressed Air	Green
	Reuse Water	purple

All exposed piping shall be labeled properly according to the pipe content with Arrow Tape that clearly show which direction the pipe flows.

INDEX TO

SECTION 09 90 01 – PROTECTIVE COATING FOR NEW CONCRETE AND MASONRY SANITARY SEWER STRUCTURES

SECTION 09 90 01

PROTECTIVE COATING FOR NEW CONCRETE AND MASONRY SANITARY SEWER STRUCTURES

PART 1 – GENERAL

1.1 GENERAL

A. This specification covers labor, materials, and equipment required for protecting and/or rehabilitating the interior of concrete sanitary sewer structures by application of a coating to protect the concrete structure from hydrogen sulfide and acid generated by microbiological sources present in the municipal wastewater environment. The protective coating shall also eliminate infiltration, repair voids, and enhance the structural integrity of the sanitary sewer structure.

B. Cementitious material will not be allowed for the protective coating; however, it will be allowed for patching operations.

C. For new sanitary sewer manholes: The protective coating shall be an acrylic polymer–base concrete coating and sealant. Procedures for surface preparation and application are described herein.

D. For force main discharge manholes (including the second manhole downstream from a force main discharge) and drop manholes: The protective coating shall be a polymer-based polyurethane or a high–build, solvent–free epoxy coating. Procedures for surface preparation, cleaning, application, and testing are described herein.

E. This specification also covers labor, materials, and equipment required for corrosion protection of the ductile iron pipes and fittings within sanitary sewer structures.

1.2 REFERENCES

A. ASTM D638 –Tensile Properties of Plastics.

B. ASTM D790 –Flexural Properties of Unreinforced/Reinforced Plastics.

C. ASTM D695 –Compressive Properties of Rigid Plastics.

D. ASTM D4414 –Standard Practice for Measurement of Wet FilmThickness of Organic Coatings by Notched Gauges.

E. ASTM D4541 –Pull–off Strength of Coatings Using a Portable Adhesion Tester.

F. ASTM D2584 –Volatile Matter Content.

G. ASTM D2240 –Durometer Hardness, Type D.

H. ASTM D543 –Resistance of Plastics to Chemical Reagents.

J. ASTM C109 –Compressive Strength Hydraulic Cement Mortars.

K. ACI 506.2–77 –Specifications for Materials, Proportioning, and Application of Shotcrete.

L. ASTM C478 –Bond Strength to Concrete: Concrete Failed.

M. ASTM C496 –Tensile Strength of Chemically Setting Silicate and Silica Chemical Resistant Mortars.

N. ASTM C579 –Compressive Strength of Chemically Setting Silicate and Silica Chemical Resistant Mortars.

O. ASTM –The published standards of the American Society for Testing and Materials, West Conshohocken, PA.

P. NACE –The published standards of National Association of Corrosion Engineers (NACE International), Houston, TX.

Q. SSPC –The published standards of the Society of Protective Coatings, Pittsburgh, PA.

R. ASTM C396 –Compressive Strength of Cement Mortars.

S. ASTM C580 –Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical–Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concrete.

T. ASTM D4541 –Standard Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement.

U. ASTM D4787 –Standard Practice for Continuity Verification of Liquid or Sheet Depth Applied to Concrete Substrates.

1.3 SUBMITTALS

A. Product Data:

1. Technical data sheet on each product used, including ASTM test results indicating the product conforms to and is suitable for its intended use per these specifications.

2. Material Safety Data Sheets (MSDS) for each product used.

3. Project specific guidelines and recommendations.

4. Warranty Certificate in accordance with Part 1.08 of this Section.

5. Applicator Qualifications

   a- Manufacturer certification that Applicator has been trained and approved in the handling, mixing, and application of the products to be used.

b- Certification that the equipment to be used for applying the products has been manufactured or approved by the protective coating manufacturer and application personnel have been trained and certified for proper use of the equipment.

c- Five (5) recent references of Applicator (projects of similar size and scope) indicating successful application of a high-build, solvent-free epoxy coating by plural component spray application.

d- Written documentation of having installed a minimum of 40,000 s.f. of protective coating similar to that specified in Part 2.04 A, within the last two (2) years.

6.

1.4 QUALITY ASSURANCE

A. Applicator shall initiate and enforce quality control procedures consistent with applicable ASTM, NACE, and SSPC standards and the protective coating manufacturer's recommendations.

B. Coating Manufacturer's authorized field representative shall be on site prior to the application of the coating system to verify that the substrate has been properly prepared, and during the application of the coating system to certify that the coating system has been properly applied. The authorized field representative will provide the Owner with an accurate and objective written report stating inspection observations on the preparation, application, and final inspection verifying adherence to coating manufacturer recommendations, industry standards, and the written specifications.

1.5 DELIVERY, STORAGE, AND HANDLING

A. All materials are to be kept dry, protected from weather, and stored under cover.

B. Protective coating materials are to be stored according to manufacturer's recommendations. Do not store near flame, heat, or strong oxidants.

C. Repair and protective coating materials are to be handled according to their material safety data sheets.

1.6 SITE CONDITIONS

A. Applicator shall conform with all local, state, and federal regulations including those set forth by OSHA, RCRA and the EPA and any other applicable authorities.

B. Method statements and design procedures are to be provided by the Contractor when confined space entry is required.

C. During coating operations of existing manholes and lift station wetwells, Contractor shall provide temporary flow bypassing of the structure if required by the City.

1.7 ACCESS TO THE WORK SITE

A. Contractor shall provide proper facilities for such access and observation of the

Work and also for any inspection or testing by others. If any Work is covered contrary to the request of the Owner's Representative or Engineer, it must, if requested by the Owner or Engineer, be uncovered for observation and replaced at the Contractor's expense.

B. Contractor shall provide access to site inspection.

1.8 WARRANTY

A. Sanitary Sewer Manholes:

All materials and workmanship shall be warranted to the owner for a period of ten (10) years.

B. Force Main Discharge Manholes and Drop Manholes:

Manufacturer shall warrant all work against defects in materials and workmanship for a period of ten (10) years from the date of final acceptance of the project. Manufacturer shall, within a reasonable time after receipt of written notice thereof, repair defects in materials or workmanship if any develop during said ten (10) year period, and any damage to other work caused by such defects or the repairing of same, at his own expense and without cost to the Owner. No prorated warranties or exclusions for improper application will be accepted. Manufacturer shall also be responsible for the costs associated with bypass pumping to maintain continuous service if repairs are necessary during the warranty period.

1.9 MEASUREMENT AND PAYMENT

A. All equipment, labor, and materials included in this section will not be measured or paid for separately. Payment will be included in the contract price for item of work to which it pertains.

1.10 LOCATION NEEDED RAVEN 404 COATINGS

1- All sewer drains manholes
2- Top of the vertical walls and top three feet of concrete walls for grit system to include influent and effluent trough
3- Top three feet of Interior walls (including ceiling) of the splitter box
4- Top three feet of the anaerobic, aeration, post anoxic, and the membrane tanks
5- Top seven feet of the pre-anoxic tank
6- Top three feet of MBT tank and the digesters

PART 2 – PRODUCTS

2.1 REPAIR MATERIALS

A. Cementitious patching, repair, and structural restoration materials used shall be

only those specified and pre–approved. Project specific submittals shall be provided including application, cure time, and surface preparation procedures which permit optimum bond strength with protective coating.

B. Repair materials shall be used to fill voids, structurally reinforce, and/or rebuild substrate surfaces, etc. as determined necessary by the engineer and protective coating applicator. Quick blending, rapid setting, high early strength, fiber reinforced, non–shrink repair mortar that can be trowelled or pneumatically spray applied must be compatible with the specified protective coating and shall be applied in accordance with the manufacturer's recommendations.

C. The following products are accepted and approved as compatible repair basecoat materials for protective topcoating for use within the specifications.

1. Infiltration Control

All fast setting materials furnished shall be applied directly to active leaks under hydrostatic pressure from the exterior of the concrete in wetwell structures or control by dewatering methods. Materials shall consist of rapid setting cements and various accelerating agents. Material shall not contain chlorides, gypsum, or metallic particles.

Should groundwater be encountered, Contractor shall be responsible for utilizing a dewatering system(s) to remove water from the excavations.

2. Repair, patching, and structural restoration

All material furnished shall be designed to fill voids and to repair or reconstruct where no hydrostatic pressure exists. Material shall consist of rapid setting cements, NSG aggregates, and various accelerating agents. Material shall not contain chlorides, gypsum, or metallic particles.

All structural restoration materials shall be specifically designed for the rehabilitation of wastewater manholes and other related concrete structures. Materials shall contain poly fiber reinforcement, fused calcium aluminate, and chemical admixtures.

D. Structural Restoration Material Properties:

Product type	Fused Calcium Aluminate or Fiberglass Cementitious
Cure Time	<48 hours
Curing gases	Non–toxic
Compressive Strength 5,000 psi	
Tensile Strength	500 psi
Flexural Strength	600 psi
Shrinkage	0% at 90% Relative Humidity

2.2 SANITARY SEWER MANHOLES AND VALVE PITS

A. Exterior Coating Material

The exterior of all manhole and valve pit structures shall be coated with three coats of a factory or field applied acrylic polymer–base concrete coating and

sealant that is neither asphalt nor coal tar based. Acceptable coating is ConSeal CS–55, colors gray or black, as manufactured by Concrete Sealants, New Carlisle, Ohio or equal. The total dry film thickness shall be 3.5 mils. Coating shall be applied to the tongue and groove area of the manhole sections as well.

B. Interior Coating Material

The interior of all manhole and valve pit structures shall be coated with three coats of a factory or field applied acrylic polymer–base concrete coating and sealant that is neither asphalt nor coal tar based. Acceptable coating is ConSeal CS–55, color gray, as manufactured by Concrete Sealants, New Carlisle, Ohio or equal. The total dry film thickness shall be 3.5 mils. Coating shall be applied to the tongue and groove area of the manhole sections as well. The coating manufacturer and applicator shall inspect and certify all coatings prior to leaving the pre–cast facility.

2.3 All NEW STRUCTURES & FORCE MAIN DISCHARGE MANHOLES

A. Protective Coating Material:

The lining system to be utilized for manhole structures shall be a multi–component stress skin panel liner system equivalent to the Raven 405 system and shall have the following properties:

B. Coating product physical properties shall be substantiated through submittal of accredited third-party testing results and shall be representative of the actual field applied product and cure mechanism(s) to be employed in the field.

C. Manufacturer: RLS Solutions Inc., Broken Arrow, Oklahoma 800–324–2810, 918–615–0020 or FAX 918–615–0140.

D. product: Raven 405 – 100% solids, solvent–free ultra high–build epoxy system exhibiting the following characteristics:

1. Product Type: amine cured epoxy
2. VOC Content (ASTM D2584): 0%
3. Compressive Strength, psi (ASTM D695): 18,000 (minimum)
4. Tensile Strength, psi (ASTM D638): 7,500 (minimum)
5. Flexural Modulus, psi (ASTM D790): 700,000 (minimum)
6. Adhesion to Concrete, psi/mode of failure (ASTM D4541/7234): 200 psi (minimum) with substrate (concrete) failure.
7. Chemical Resistance (ASTM D543/G20) immersion service for:
   a. Municipal sanitary sewer environment
   b. Sulfuric acid, 30%
   c. Sodium hydroxide, 10%
8. Water Vapor Permeance, WVP, metric perms (ASTM D1653 Method B, Condition C @ ≤80 mils DFT): <0.002 metric perms
9. Successful Pass: Sanitation District of L.A. County Coating Evaluation Study or SSPWC 210.2.3.3 (Greenbook "Pickle Jar" Chemical Resistance test)

2.4 COATING APPPLICATION EQUIPMENT

A. Manufacturer approved heated plural component spray equipment.

B. Hard to reach areas, primer application and touch–up may be performed using hand tools.

2.5 STRUCTURAL RESTORATION MATERIAL AND PROTECTIVE COATING APPLICATION EQUIPMENT

A. Structural restoration mortars and protective coatings shall be applied with manufacturer approved equipment.

PART 3 – EXECUTION

3.1 ACCEPTABLE APPLICATORS

A. Repair mortar must be applied by manufacturer trained and approved applicators. The repair mortar shall be applied according to manufacturer's recommendations.

B. Protective coating must be applied by a Certified Applicator of the protective coating manufacturer and according to manufacturer specifications.

3.2 EXAMINATION

A. Appropriate actions shall be taken to comply with local, state and federal regulatory and other applicable agencies with regard to environment, health and safety.

B. All bidders are required to verify that they have visited the jobsite and are familiar with the conditions and the entire scope of work. Bidders shall field verify the attached plans and perform their own quantity measurements prior to bidding.

C. Contractor shall provide a minimum 24-hour notice to the City Inspector/Representative and Engineer for the following conditions:

1. after final surface preparation is completed but before structure rehabilitation;
2. after patching operations have cured, and
3. after each coating layer is applied.

D. Installation of the protective coating shall not commence until the concrete substrate has properly cured in accordance with these specifications.

E. Temperature of the surface to be coated should be maintained between 60° F and 100° F during application. Prior to and during application, care should be taken to avoid exposure of direct sunlight or other intense heat source to the structure being coated. Where varying surface temperatures do exist, care should be taken to apply the coating when the temperature is falling versus rising (i.e., late afternoon into evening vs. morning into afternoon).

3.3 SURFACE PREPARATION

A. Applicator shall inspect all surfaces specified to receive a protective coating prior to surface preparation. The existing piping, valves, and appurtenances shall be protected during structural rehabilitation and protective coating application.

The pipes and connectors are to be top coated with 30–50 mils DFT nominal. The pipes and connectors are to be primed by the fabricator with epoxy primer (not coldtar or asphaltic base) that is compatible with the protective coating. After installation, the pipes are to be pressure washed using at a minimum 5,000 PSI and 4 GPM washer and/or abrasive blast cleaned to an SSPC–SP7 'brush–off' specification as necessary for the window of overcoating of the primer.

B. All contaminants including: oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed.

C. All concrete or mortar that is not sound or has been damaged by chemical exposure shall be removed to a sound concrete surface or replaced.

D. Old concrete must be firm and structurally sound as specified by the Engineer.

E. Surface preparation method(s) should be based upon the conditions of the substrate, service environment and the requirements of the protective coating to be applied.

F. Surfaces to receive protective coating shall be cleaned and abraded to produce a sound surface with adequate profile and porosity to provide a strong bond between the protective coating and the substrate. At a minimum, this will be achieved with a low-pressure water cleaning equipment using a 0-degree rotating nozzle at a minimum 3,500 psi and 4 gpm. Other methods such as high-pressure water jetting (refer to NACE Standard No. 6 /SSPC–SP 13), abrasive blasting, shot blasting, grinding, scarifying and/or acid etching may also be used. In addition, detergent water cleaning and hot water blasting may be necessary to remove oils, grease or other hydrocarbon residues from the concrete. The method(s) used shall be performed in a manner that provides a uniform, sound clean, neutralized surface that is not excessively damaged.

3.4 APPLICATION OF REPAIR MATERIALS

A. Areas where structural steel has been exposed or removed shall be repaired in accordance with the Project Engineer's recommendations.

B. Repair/Structural Restoration materials shall meet the specifications here and as described in part 2.01A of these specifications. The materials shall be applied utilizing proper equipment on to specified surfaces. The structural restoration material shall match the original undamaged surface.

C. Infiltration shall be stopped by using a material which is compatible with the specified repair mortar, waterproof quick setting mortar–type that is suitable for top coating with the specified protective coating. Contractor shall completely identify the types of grout, mortar, and sealant for repair of leak defects and provide case histories of successful use.

D. Infiltration areas that require crack injection shall be covered in this scope of work. Injection holes shall be drilled through the wet well at 120-degree angles from each other at the same plane of elevation. Rows shall be separated no more than three vertical feet, and the holes shall be staggered with the holes in

the rows above and below. Provide additional injection holes near observed defects and pipe seals. A minimum of 6 injection holes shall be provided per defect.

Grout shall be injected through holes under pressure with a suitable probe. Injection pressure shall not cause damage to the wetwell structure or surrounding surface features. Grout shall be injected through the lowest holes first. Grouting from the ground surface will not be allowed. Provide additional injection holes if necessary to ensure grout travel, verified by field observation of grout at adjacent defects or holes. Patch injection holes using a waterproof quick setting mortar after cleaning with a drill.

E. The approved repair materials shall provide a smooth surface with an average profile equivalent to coarse sandpaper to optimally receive the protective coating. No bugholes or honeycomb surfaces should remain after the final trowel procedure of the repair mortar.

F. The repair materials shall be permitted to cure according to manufacturer recommendations. Curing compounds should not be used unless approved for compatibility with the specified protective coating.

G. After required cleaning and repair is performed, all surfaces shall be inspected for remaining laitance prior to protective coating application. Any evidence of remaining contamination or laitance shall be removed by additional abrasive blast, shotblast or other approved method. If repair materials are used, refer to these specifications for surface preparation. Areas to be coated must also be prepared in accordance with these specifications after receiving a repair mortar and prior to application of the protective coating.

3.5 APPLICATION OF PROTECTIVE COATING

A. Application procedures shall conform to the recommendations of the protective coating manufacturer, including material handling, mixing, environmental controls during application, safety, and spray equipment.

B. The equipment shall be specifically designed to accurately ratio and apply the specified protective coating materials and shall be regularly maintained and in proper working order.

C. The protective coating material must be applied by a certified applicator of the protective coating manufacturer.

D. Specified surfaces shall be coated by a moisture tolerant, solvent–free, protective coating properties as described in these specifications.

E. Application equipment approved by the coating manufacturer shall be used to apply each coat of the protective coating.

F. If necessary, subsequent top–coating or additional coats of the protective coating should occur as soon as the basecoat becomes tack free, ideally within 12 hours but no later than the recoat window for the specified products. Additional surface preparation procedures will be required if this recoat window is exceeded.

3.6 TESTING AND INSPECTION

A. During application a wet film thickness gage meeting ASTM D4414 Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used to ensure a uniform thickness during application.

B. After the protective coating has set hard to the touch it shall be inspected with high–voltage holiday detection equipment meeting ASTM D4787 – Standard Practice for Continuity Verification of Liquid or Sheet Depth Applied to Concrete Substrates. The spark tester shall be initially set at 100 volts per 1 mil (25 microns) of film thickness applied. All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, additional protective coating material can be hand applied to the repair area. All touch–up/repair procedures, for areas that do not meet the specified thickness, shall follow the protective coating manufacturer's recommendations.

   The NACE Certified Coatings Inspector must be present and monitor the holiday testing (and repairs, if necessary). The final inspection report is to include the holiday testing results.

C. A final visual inspection shall be made by the Inspector and manufacturer's representative. Any deficiencies in the finished coating shall be marked and repaired according to the procedures set forth herein by Applicator.

END OF SECTION

INDEX TO

SECTION 10 14 00 – IDENTIFYING DEVICES

SECTION 10 14 00

IDENTIFYING DEVICES

PART 1 – GENERAL

1.01 REFERENCES

A. The following is a list of standards that may be referenced in this Section:

1. American National Standards Institute (ANSD:

   a. A13.1, Schemes for the Identification of Piping Systems.
   b. A117.1, Buildings and Facilities–Accessibility and Usability for Physically Handicapped People.
   c. D6.1, Manual on Uniform Traffic Control Devices for Streets and Highways.

2. American Society for Testing and Materials (ASTM): A53, Standard Specification for Pipe, Steel, Black and Hot–Dipped, Zinc–Coated Welded and Seamless.

3. The Chlorine Institute, Inc.: WC–1, Wall Chart: Handling Chlorine Cylinders and Ton Containers.

4. Federal Specifications (FS): L–P–387 A(1), Plastic Sheet, Laminated, Thermosetting (for Designation Plates).

5. International Conference of Building Officials (ICBO): Uniform Fire Code (UFC).

6. National Fire Protection Association (NFPA):

   a. 49, Hazardous Chemicals Data.
   b. 704, Standard System for the Identification of the Fire Hazards of Materials.

7. Occupational Safety and Health Act (OSHA).

1.02 SUBMITTALS

A. Shop Drawings:

1. Drawings showing layouts, actual letter sizes and styles, and project–specific mounting details for every sign type.

2. Manufacturer's literature showing letter sizes and styles, sign materials, and standard mounting details.

B. Samples: One full size for each type of nameplate, sign, and label specified.

C. Quality Control Submittals: Manufacturer's installation instructions.

PART 2 – PRODUCTS

2.01 DOOR NAMEPLATES (TYPE A)

A. Material: Three–ply laminated fiberglass, minimum 1/8–inch thick, with contrasting color core message layer between two clear weather–resistant surface layers.

B. Manufacturers:

1. Brady Signmark
2. Seton Name Plate Corp.
3. Approved Equal

C. Finish: Non –directional matte.

D. Size: See Sign Schedule (attached)

E. Letters:

1. Size: I–inch high unless noted otherwise in schedule.
2. Color: See Sign Schedule (attached).
3. Style: See Sign Schedule (attached).
4. Message Text: See Sign Schedule (attached).

2.02 PICTORIAL SYMBOLS (TYPE G)

A. Material: Three–ply laminated fiberglass, minimum 1/8–inch thick, with contrasting color core message layer between two clear weather–resistant surface layers. Use international handicapped unisex toilet symbol.

B. Manufacturers:

1. Brady Signmark
2. Seton Name Plate Corp.
3. Approved Equal

C. Size: See Sign Schedule (attached).

D. Manufacture: ANSI A117.I, Section 4.30.

2.03 METAL SIGNS (TYPE B):

A. Material: Baked enamel finished 20–gauge (minimum) steel or 18–gauge (minimum) aluminum signs.

B. Manufacturers:

1. Seton Name Plate Corp.
2. Nutheme Illustrated Safety Co.
3. Approved Equal

2.04 HAZARDOUS MATERIAL SIGNS (TYPE H):

A. Conform to NFPA 704, 49 and NFPA HAZ–01.

B. Material: Fiberglass 1/8-inch-thick or Reflective sheeting applied to 0.040–inch thick aluminum.

C. Background, Letters, and Numbers: Die–cut vinyl with pressure sensitive adhesive.

D. Manufacturers:

1. Brady Signmark.
2. Seton Name Plate Corp.
3. Approved Equal

2.05 CUSTOM SIGN (TYPE Q):

A. Provide a facility plaque made by Impact Signs of LaGrange, IL or approved equal.

B. Size: 16" high x 18" long

C. Material: Cast Bronze

D. Finish: Light Oxidized

E. Background Texture: Stipple, Black

F. Border: Single

G. Attachment: Rosette #4

H. Text: Copperplate, Capital Letters

I. Message: See attached mock-up of plaque

2.06 IDENTIFICATION LABELS

A. PVC Pipe Labels and Flow Direction Arrows:

1. Lettering and Arrows: Black print.

2. Background: OSHA safety yellow.

3. Material: Manufacture from or encase in outdoor grade plastic or vinyl that will resist damage or fading from wash-down, sunlight, mildly corrosive

atmosphere, dirt, grease, and abrasion.

4. Label, Lettering Size, and Color: ANSI A13.I.

5. Message: See Piping Schedule.

6. Labels:

   a. Snap–Around Type: Size for finished outside diameter of pipe and insulation.
   b. For 6 Inches and Over Diameter Pipe: May furnish strap–on type fastened without use of tools with plastic or stainless-steel straps.
   c. Firmly grip pipe so labels remain fixed in vertical pipe runs.

7. Manufacturers and Products:

   a. T & B/Westline, Rariton, NJ; Model WSS Snap–Around.
   b. Seton Name Plate Corp., New Haven, CT; Setmark Series.

8. Note: All other pipes shall have painted labels; see Section 09 90 00, Painting and Protective Coating.

B. Equipment Labels:

1. Applies to equipment with assigned tag numbers wherever specified on Drawings.

2. Lettering: Black bold face, 3/4–inch minimum high.

3. Background: OSHA safety yellow.

4. Materials: Either of the following:

   a. Aluminum or stainless-steel base with a baked–on finish that is suitable for use on wet, oily, exposed, abrasive, and corrosive areas.
   b. Fiberglass with fiberglass–encased lettering.

5. Furnish I–inch margin on each end of label for mounting. On fiberglass labels furnish grommets at each end for mounting.

5. Size:

   a. Two inches minimum and 3 inches maximum high by 14 inches minimum and 18 inches maximum long.
   b. Furnish same size base dimensions for all labels.

7. Message: Equipment names and tag numbers as used in sections where equipment is specified.

8. Manufacturers and Products:

a. T & B/Westline Co., Rariton, NJ; Type KQ.
b. Seton Name Plate Corp., New Haven, CT; Style EB.
c. W. H. Brady Co., Milwaukee, WI; Fiber–Shield.

2.07 ANCILLARY MATERIALS

A. Fasteners: Stainless steel screws or bolts of appropriate sizes.

B. Pipe Posts: 2–1/2–inch 304 Stainless steel pipe meeting ASTM A53, Type S, Grade B.

C. Chain: Type 304 stainless steel, No. 16 single jack chain or No.2 double loop coil chain.

2.08 VALVE TAGGING

All exposed valves regardless of size shall be tagged with an Aluminum engraved letters

PART 3 – EXECUTION

3.01 INSTALLATION –GENERAL

A. In accordance with manufacturer's recommendations.

B. Mount securely, plumb, and level.

3.02 DOOR NAMEPLATES AND PICTORIAL SYMBOLS

A. Attach to doors or walls adjacent to doors with self–sticking permanent removable adhesive. See Door Schedule for locations and messages.

B. Mount with bottom of nameplate at 5 feet 6 inches above floor.

3.03 SIGNS

A. Fasten to walls or posts or hang as scheduled. Anchor in place for easy removal and reinstallation with ordinary hand tools.

B. Information, Exit, and Safety Signs:

1. Install facing traffic. Locate for high visibility with minimum restriction of working area around walkways and equipment.

2. Removable with ordinary hand tools without leaving scars on structure or equipment.

C. Hazardous Material Signs:

1. Install where required by NFPA No. 704 and UFC, Chapter 79.

2. Install at entrances to spaces where hazardous materials are stored, dispensed, used, or handled and on sides of stationary tanks.

3. Specific Materials:

Hazardous Materials					
Mark	**Material**	**Health Hazard (Blue)**	**Flammability Hazard (Red)**	**Instability Hazard (Yellow)**	**Special Hazard (White)**
See Schedule	Emulsion Polymer	1	1	0	
See Schedule	Citric Acid	2	1	0	
See Schedule	Ferric Chloride (35 – 40% solution)	3	0	0	
See Schedule	Sodium Hydroxide (10 – 30% solution)	2	0	0	
See Schedule	Sodium Hypochlorite (12 – 15% solution)	2	0	0	
See Schedule	No 2 Diesel Fuel	0	2	0	
See Schedule	Potable Water	0	0	0	4
See Schedule	Non-Potable Water (effluent)	7	0	0	0

3.04 IDENTIFICATION LABELS

A. PVC Pipe Labels and Flow Indication Arrows:

1. Locate at all connections to equipment, valves, or branching fittings at wall boundaries.

2. At intervals along piping not greater than 18 feet on center with at least one label applied to each exposed horizontal and vertical run of pipe.

3. At exposed piping not normally in view, such as above suspended ceilings and in closets and cabinets.

4. Supplementary Labels: Provide to Owner those listed on Piping Schedule that do not receive arrows.

5. Application: To pipe only after painting in vicinity is complete or as approved by Engineer.

6. Installation: In accordance with manufacturer's instructions.

B. Equipment Labels:

1. Locate and Install: On equipment or concrete equipment base.

2. Anchor to equipment or base for easy removal and replacement with ordinary hand tools.

3.05 SIGN SCHEDULE

A. Sign Schedule following "END OF SECTION" is a tabulation of sign characteristics and mounting information for each sign shown by its "Mark" on Drawings and is a part of this Specification.

B. Provide signs as scheduled.

C. Meet requirements of Federal Occupational Health Act (OSHA).

1. Close valve on truck hose.

3.06 SUPPLEMENTS

A. The supplements listed below, following "END OF SECTION," are part of this Specification.

1. 3 Sign Schedules.

2. 1 Mock-Up Plaque. Plaque Shall be minimum 18"X24" and made of brass with black lettering (provide shop drawing for owner approval)

END OF SECTION

SIGN SCHEDULE – EQUIPMENT / OPERATIONS BUILDING & BASINS

SIGN							MOUNTING			LETTERING					OTHER REQUIREMENTS
Location	Qty	Type	Format	Maximum Size		Color	Location	Method	Height to Centerline	Height	Style	Color	Message	Faces	
				Width	Height										
Upper Level Bldg	1	A	As specified	12"	6"	Gray	Door	Tape	Below Window	1"	Helvetica	Black	Control Room	1	Install on Door
Upper Level Bldg	1	A	As specified	12"	6"	Gray	Door	Tape	Below Window	1"	Helvetica	Black	Mechanical Room	1	Install on Door
Upper Level Bldg	1	G	As specified	6"	6"	Gray	Door	Tape	5' 0"	Symbol	Helvetica	Black	Unisex	1	Install on Door
Lover Level Bldg	2	A	As specified	12"	6"	Gray	Door	Tape	Below Window	1"	Helvetica	Black	Electrical / MCC Room	1	Install on 2 Doors
Lower Level Bldg	1	A	As specified	12"	6"	Red/White	Wall	Bolts	5' 6"	1"	Helvetica	Black	Danger High Voltage	1	As directed by Engineer
Lower Level Bldg	1	A	As specified	12"	6"	Gray	Door	Tape	Below Window	1"	Helvetica	Black	Support Room	1	Install on West Personnel Door (Ext)
Lower Level Bldg	1	A	As specified	12"	6"	Gray	Door	Tape	Below Window	1"	Helvetica	Black	Chemical Room	1	Install on West Personnel Door (Ext)
Lower Level Bldg	2	A	As specified	12"	6"	Gray	Door	Tape	Below Window	1"	Helvetica	Black	Equipment Room	1	Install on 2 Personnel Doors (Int & Ext South)
Lower Level Bldg	1	H	Standard Hazmat	14"	10"	Red/White	Wall	Tape	5'6"	n/a	n/a	Black	Danger Sodium Hypochlorite	1	Install on Ext. of Chemical Room Door
Lower Level Bldg	1	H	Standard Hazmat	6"	6"	Standard Hazmat	Door	Tape	Below Window	n/a	n/a	Standard Hazmat	Corrosion Hazmat Symbol	1	As directed by Engineer
Various	10	B	Standard	20"	14"	Red/White	Chain	Hanging	Various	1"	Helvetica	Black	Non-potable Not for Drinking	1	As directed by Engineer
Lower Level Bldg	1	H	Standard Hazmat	14"	10"	Red/White	Wall	Tape	5' 6"	n/a	n/a	Black	Danger Sodium Hydroxide	1	As directed by Engineer
Lower Level Bldg	1	Q	See Spec	18"	16"	Cast Bronze, see Spec	Wall	Rosette Screw	5'-6"		See Spec	Light Oxidized	See Spec	1	See Spec for details
Various	3	B	Standard	12"	6"	Blue/White	Wall		Various	1"	Helvetica	Black	Potable Water	1	As directed by Engineer

SIGN SCHEDULE – DEWATERING BUILDING

10 14 00 – 9

SIGN							MOUNTING			LETTERING					OTHER REQUIREMENTS
Location	Qty	Type	Format	Maximum Size		Color	Location	Method	Height to Centerline	Height	Style	Color	Message	Faces	
				Width	Height										
Dewatering Building Exterior	1	A	As specified	12"	6"	Gray	Door	Tape	Below Window	1"	Helvetica	Black	Dewatering Building	1	Install on Personnel Door
Dewatering Building Interior Wall at Polymer Storage	1	H	Standard Hazmat	6"	6"	Standard Hazmat	Door	Tape	Below Window	n/a	n/a	Standard Hazmat	Corrosion Hazmat Symbol	1	As directed by Engineer
Dewatering Building Interior Wall at Polymer Storage	2	H	Standard Hazmat	14"	10"	Red/White	Wall	Tape	5' 6"	n/a	n/a	Black	Danger Polymer Storage	1	As directed by Engineer
Various	2	B	Standard	12"	6"	Blue/White	Wall	Hang	Various	1"	Helvetica	Black	Potable Water	1	As directed by Engineer
Dewatering Bldg Interior	1	n/a	Standard	10"	7"	Red/Black White	on wall to right of man door	Bolt	5'-6"	Std	Standard	White / Black	DANGER FLAMMABLE	1	Standard Plastic Danger Sign
Dewatering Bldg Interior	1	n/a	Standard	10"	7"	Yellow / Black	on wall to right of man door	Bolt	5'-6"	Std	Standard	Yellow / Black	CAUTION HIGH NOISE LEVEL AREA	1	Ear Protection Fiberglass Sign
MCC Room	1		Standard	10"	7"	Blue/White	Wall	Hang	Various	1"	Helvetica	Black	MCC Room High Voltage	1	As directed by Engineer
Various	2	B	Standard	12"	6"	Blue/White	Wall	Hang	Various	1"	Helvetica	Black	DANGER Lime/Alum Storage	1	As directed by Engineer
D.O System	10	B	Standard	12"	6"	Blue/White	Wall	Hang	Various	1"	Helvetica	Black	D.O System	1	As directed by Engineer
UV System	1	B	Standard	12"	6"	Blue/White	Wall	Hang	Various	1"	Helvetica	Black	Disinfection UV System	1	As directed by Engineer

SIGN SCHEDULE – OTHER PLANT AREAS

10 14 00 – 10

SIGN							MOUNTING			LETTERING					OTHER REQUIREMENTS
Location	Qty	Type	Format	Maximum Size		Color	Location	Method	Height to Centerline	Height	Style	Color	Message	Faces	
				Width	Height										
Plant Entrance Gates	2	A	As Specified	44"	24"	White	On chain link fence gate, as directed	Plastic ties on 4 corners	5'-6"	2"	Helvetica	Black	TRAVIS FIELD WATER RECLAMATION FACILITY IN CASE OF EMERGENCY CALL 912-XXX-XXXX	1	Provide hole in each corner for attachment. Phone number to be provided upon ordering.

SAVANNAH
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Travis Field

WATER RECLAMATION FACILITY

4.0 MGD MEMBRANE BIOREACTOR
(date of commissioning)

Mayor **Eddie Deloach**

Alderman
Carolyn Bell **John Hall**
Brain Foster **Julian Miller**
Van R. Johnson **Dr. Estella Edwards Shabazz**
Bill Durance **Toney Thomas**

City Manager **Rob Hernandez**
Water Resource Director **John Sawyer**

CONSULTING ENGINEER
Thomas & Hutton Engineering Co.

GENERAL CONTRACTOR
(to be determined)

INDEX TO

SECTION 10 71 14 – EXTERIOR SHUTTERS

SECTION 10 71 14

EXTERIOR SHUTTERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes exterior shutters.

1.3 SUBMITTALS

A. Product Data for each type of shutter system required, including construction details, dimensions of components, profiles, and finishes.

1. Include schedule identifying each opening by number.

B. Shop Drawings for each type of shutter system required showing fully dimensioned plans, elevations, sections, and details. Show anchors and inserts for items attached to permanent construction. Include information not fully detailed in Product Data.

1. Include Setting Drawings, templates, and installation instructions for anchorages.

C. Samples for verification of the following:

1. Shutter material, 8 by 10 inches.
2. Fastener system components, one of each component.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed installation of shutter system similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Single-Source Responsibility: Provide each type of shutter system as a complete unit produced by a single manufacturer, including necessary mounting accessories, fittings, and fastenings.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver shutter systems until construction is ready for their installation. Protect units from damage during delivery, storage, handling, and installation.

1.6 PROJECT CONDITIONS

A. Field Measurements: Where components are indicated to be fitted to other construction, verify dimensions of other construction by field measurements before fabrication and show recorded measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 EXTERIOR SHUTTERS

A. Manufacturers: Subject to compliance with requirements, provide shutters as manufactured by one of the following:

1. Custom Shutter Co.
2. MetalTech.
3. Willard Shutter Company.

B. Material: Extruded aluminum.

C. Hardware: Manufacturer's standard hinges and tilt arm components.

D. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604 and containing not less than 50 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

E. Style: Removable storm shutter for all exterior windows

F. Grill shutters style for the sludge dewatering canopy as indicated on the drawing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install shutter system components level, plumb, and at indicated alignment with adjacent work.

B. Protect metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

END OF SECTION

INDEX TO

SECTION 10 80 00 – MISCELLANEOUS SPECIALTIES

SECTION 10 80 00

MISCELLANEOUS SPECIALTIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Toilet and Bath Accessories.
2. Lockers.
3. Benches.
4. Portable Fire Extinguishers.

1.02 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Factory Mutual (FM).
2. National Fire Protection Association (NFPA): No. 10, Standard for Portable Fire Extinguishers.
3. Occupational Safety and Health Act (OSHA).
4. Underwriters Laboratories Inc. (UL): Fire Protection Equipment List.
5. ASTM International:

    a. A591, Standard Specification for Steel Sheet, Electrolytic Zinc–Coated, for Light Coating Weight [Mass] Applications.
    b. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:

    a. Manufacturer's literature for toilet and bath accessories clearly indicating:

        1) Engineer's identification mark, size, and description of Components.
        2) Base material with surface finish inside and out.
        3) Hardware and locks and attachment devices.
        4) Description of rough–in framing.
        5) Details of blocking and anchorage required.

B. Informational Submittals:

1. Manufacturers' descriptions, installation data, color charts and cleaning and service instructions for all items proposed for use. Clearly identify each item.
2. Distributor's List: List of local distributors for all supplies required for the accessories installed.

PART 2 - PRODUCTS

2.01 TOILET AND BATH ACCESSORIES

A. Manufacturers:

1. Materials and products specified in this section shall be products of Bradley Corp.
2. Other Manufacturers:

   a. Bobrick Washroom Equipment, Inc.
   b. Accessory Specialties, Inc.

B. Finishes:

1. Stainless steel.
2. Manufacturer's or brand name on face of units is not acceptable.

C. Furnish accessory items listed where indicated by mark or note on Drawings.

Item	Mark	Bradley
Surf Mounted Double Roll Toilet Paper Dispense	TPD	No. 5123
Horizontal Wall Mounted Liquid Soap Dispenser	SD – 11	NO. 6542
Mirror, Size on Dwgs	MIR	No. 782
Surf. Mounted Paper Towel Dispenser	PTD – 1	No. 950 – 15
Waste Receptacle	WR – 1	No. 377 – 38
Surf. Mounted Napkin Disposal	ND	No. 4781 – 15
Mop and Broom Holder (44")	M&BH	No. 9954
Robe Hook	RH	No. 912
Grab Bars 42"	GB – 1	No. 812 – 001
Grab Bars 36"	GB – 2	No. 812 – 001
Towel Bar	TB	No. 907
Shower Curtain w/Hooks 60"	SC – 2	No. 9537

D. See Plumbing Specifications for prefabricated shower enclosure with built-in grab bars, soap dish, folding seat and curtain rod.

E. Anchors: Furnish anchors, fasteners, or other devices necessary for a complete, secure installation.

F. Fasteners: Tamper–proof screws or bolts.

G. Supplies: Furnish fill supplies, such as paper goods, soap, and napkins, as recommended by accessory manufacturer.

2.02 LOCKERS

A. Solid plastic lockers to be manufactured by Scranton Products (Santana/Comtec/Capitol), 801 Corey Street, Moosic, PA 18507 or approved equal. These specifications will be regarded as minimum.

B. Locker doors and door frames shall be made from high impact, high density polyethylene (HDPE) formed under high pressure into solid plastic components 1/2 inch thick with homogeneous color throughout.

C. Sides, tops, bottoms, backs, and shelves shall be made from high impact, high density, polyethylene (HDPE) formed under pressure into solid plastic components 3/8 inch thick with homogenous natural color throughout. Components shall have machined edges to accept assembly brackets. Outside, insides, tops, bottoms, backs, dividers and shelves shall be natural in color.

D. Material Testing: All solid plastic components shall resist deterioration and discoloration when subjected to any of the following:

Acetic Acid 80%	Acetone
Ammonia Liquid	Ammonium Phosphate
Bleach 12%	Borax
Brine	Caustic Soda
Chlorine Water	Citric Acid
Copper Chloride	Core Oils
Hydrochloric Acid 40%	Hydrogen Peroxide 30%
Isopropyl Alcohol	Lactic Acid 25%
Lime Sulfur	Nicotine
Potassium Bromide	Soaps
Sodium Bicarbonate	Trisodium Phosphate
Urea and Urine	Vinegar
Testing in accordance with corrosion testing procedure established by the Unite State Plastic Corporation.	

E. Continuous latch shall be made from high impact HDPE plastic and capable of accepting various locking mechanisms. Latch shall be securely fastened to the entire length of the door, providing a continuous latch.

F. Door hinge shall be made from heavy duty extruded aluminum with a powder coating to match the locker door and frame. Door hinge shall be full length assembled onto the door and front.

G. Assembly profile shall be full depth, width and height of the lockers. Profile shall be made from PVC plastic and snap fit assembled onto locker outsides, insides, backs, tops and bottoms. The snap–fit design offers a continuous connection between components.

H. Coat hooks shall be two–prong and made from high impact plastic. Hooks shall be mounted to the bottom of the shelf or divider –one each per door opening (Standard on Single, Double & Triple tier lockers only).

I. All HDPE components shall have a smooth "orange peel" finish. Locker doors and door frames shall be of the same color and selected from the standard full color line.

J. Locker components shall be fabricated square and rigid with a finish free of scratches and chips.

K. Solid plastic locker components shall snap together for easy assembly and shall provide a solid and secure construction. Adjacent lockers shall share a common side panel. Locker units shall be manufactured for assembly in a group of no more than five adjacent lockers.

L. Lockers will have a warranty for a period of 15 years. The HOPE plastic doors, panels, dividers, and shelves shall be warranted against corrosion, rust, delamination and breakage under normal use.

2.03 PLASTIC HDPE BENCHES

A. Locker room benches and pedestals to be supplied by Scranton Products (Santana/Comtec/Capitol), Moosic, P A, or approved equal.

B. Locker room bench tops shall be *1–1/2* inch thick with homogeneous color throughout, constructed from High Density Polyethylene (HDPE) resins. Locker bench tops shall be fabricated from polymer resins compounded under high pressure, forming a single component which is waterproof, nonabsorbent and has a self–lubricating surface that resists marks from pens, pencils, markers and other writing instruments. All plastic components shall be covered with a protective plastic masking.

C. Color of bench to be as shown on finish schedule or as selected by the Engineer.

D. Locker room bench tops shall be 1–1/2–inch thick with all edges rounded to a 1/4–inch radius. Standard bench top size is 24 inches wide by 48 inches for a single piece.

E. Aluminum pedestals shall be 16 inches high, and secured to the bench tops with stainless steel, #14 Phillips head screws and secured to the floor using lead expansion shields and stainless steel, Phillips head screws.

F. Bench to have warranty against breakage, corrosion, and delamination under normal conditions for 15 years from the date of receipt by the customer. If materials are found to be defective during that period for reasons listed above, the materials will be replaced free of charge (Labor not included in warranty)

2.04 PORTABLE FIRE EXTINGUISHERS

A. General:

1. Conform to NFPA 10 for fire extinguishers.
2. Furnish fire extinguishers and cabinets from one manufacturer.
3. All Extinguishers: UL listed, charged and ready for service.

B. Multipurpose Hand Extinguisher (F. Ext–I):

1. DuPont FE–36 Clean Agent extinguishing agent. Pressurized, red enameled steel shell cylinder.
2. Activated by top squeeze handle.
3. Agent propelled through hose or opening at top of unit.
4. For use on A, B, and C class fires.
5. Minimum UL Rating: I–A: 10–B:C, 9.5–pound capacity.

C. Manufacturers: Ansul CLEANGUARD.

PART 3 - EXECUTION

3.01 INSTALLATION OF SPECIALTIES

A. Follow manufacturer's recommendations and printed instructions. Consult with Engineer so that minor adjustments in the locations can be decided if necessary.

1. Install materials plumb or level as applicable and attach securely to adjacent materials with suitable fasteners.
2. Prevent scratching or damaging adjacent materials during installation.

B. Installation of Toilet and Bath Accessories:

1. Preparation: Coordinate support framing and backing as necessary for the proper installation of all accessories.

2. Installation:

   a. Locate where mark is shown on Drawings at height as indicated on Drawings or required by code.
   b. Follow manufacturer's instruction and recommendations.
   c. Install and securely anchor all accessories in their proper locations, plumb and level and without distortion.
   d. Remove all protective masking and clean surfaces, leaving them

free of soil and imperfections.

e. Fill all units with necessary supplies within 10 days before Substantial Completion.

f. Deliver to Owner all keys and devices required to fill and service units.

C. Lockers and Benches:

1. Examine areas to receive the locker room benches for anchorage blocking that may affect installation of benches or lockers. Report any discrepancies to the engineer.
2. Take complete and accurate measurements of locations to receive locker room benches.
3. Install locker room benches and lockers in a rigid, straight, plumb, and level manor, with plastic laid out as shown on shop drawings and manufacturer's installation instructions.
4. No evidence of cutting, drilling, and/or patching shall be visible on the finished work.
5. Finished surfaces shall be cleaned after installation and be left free of all imperfections.
6. Install lockers at the location shown in accordance with the manufacturer's instructions for plumb, level, rigid, and flush installations.
7. Anchor the units to wall studs through the locker back and to the floor using I–1/2–inch pan head screws. Furring must be installed between lockers and wall of installation.
8. Lockers can be either floor–mounted or installed on a 4–inch high base. Hardware and instructions for either method shall be provided by the manufacturer.
9. Number plates shall be available for field mounting.

D. Fire Extinguishers:

1. Fasteners: Furnish necessary screws, bolts, brackets, and other fastenings of suitable type and size to secure items of fire and safety equipment in position.

    a. Metal expansion shields for machine screws at concrete and masonry.
    b. Interior: Rust–resistant.
    c. Exterior: Stainless steel.
    d. Brackets: For all hand extinguishers not located in cabinets, furnish heavy–duty brackets with clip–together strap for wall mounting.
    e. Provide adequate backing for mounting surfaces.
    f. Install top of Extinguisher: No more than 54 inches above floor.

END OF SECTION

INDEX TO

SECTION 11 53 13 – LABORATORY FUME HOOD

SECTION 11 53 13

LABORATORY FUME HOOD

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division I Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Fume hood base cabinets with countertops.
2. Laboratory sinks and cup sinks in fume hoods.
3. Water, laboratory gas, and electrical service fittings in fume hoods.

B. Related Sections include the following:

1. Section 12 35 53 Laboratory casework.
2. Fume hood duct connections, including ducts.
3. Sections for connecting service utilities at indicated point. Piping and wiring for service fittings within fume hoods and casework up to point of connection are specified in this Section.
4. Electrical connection of fume hoods.

1.3 PERFORMANCE REQUIREMENTS

A. Containment: Provide fume hoods with the following performance ratings at a face velocity of 100 fpm (0.51 m/s) and a release rate of 4.0 L/min. when tested according to ASHRAE 110:

1. As-Manufactured Rating: AM 0.10 (0.10 ppm).

B. Structural Performance: Provide fume hood components capable of withstanding the following loads without permanent deformation, excessive deflection, or binding of cabinet drawers and doors:

1. Fume Hood Base Stands: 50-1b/ft. (74-kg/m) countertop, 75 lb/ft. (112 kg/m) on countertop, plus weight of hood.

1.4 SUBMITTALS

A. Product Data: For each type of laboratory fume hood specified.

B. Shop Drawings: For laboratory fume hoods. Include plans, elevations, sections, details, and attachments to other work.

1. Indicate locations and types of service fittings, together with associated service connections required.
2. Indicate plumbing connections, duct connections, electrical connections, and locations of access panels.
3. Include roughing-in information for mechanical, plumbing, and electrical connections.

C. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors, textures, and patterns available for fume hood exterior, cabinets, and each type of top material indicated.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain laboratory fume hoods through one source from a single manufacturer.

1. Obtain through same source from the same manufacturer as laboratory casework specified in Division 12 Section "Wood Laboratory Casework."

B. Fume Hood Standard: Provide fume hoods complying with the requirements of SEFA 1.1, "Laboratory Fume Hoods--Recommended Practices."

C. Safety Glass: Products complying with ANSI Z97.1 and testing requirements of 16 CFR, Part 1201 for Category II materials.

1. Subject to compliance with requirements, permanently mark safety glass with certification label of SGCC or another certification agency acceptable to authorities having jurisdiction.

1.6 PRODUCT HANDLING

A. Coordinate delivery of fume hoods with delivery of other laboratory casework components.

B. Protect finished surfaces from soiling and damage during handling and installation. Keep covered with polyethylene film or other protective covering.

1.7 COORDINATION

A. Coordinate installation of fume hoods with laboratory casework, fume hood exhaust ducts, and plumbing and electrical work.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Desk Manufacturing Co.; Taylor Division.
2. Fisher Scientific, Inc.
3. Kewaunee Scientific Corp.; Laboratory Division.
4. Mohon International, Inc.; Campbell Rhea.
5. Norlab, Inc.
6. St. Charles Manufacturing Co.

2.2 MATERIALS

A. Steel Sheet: Commercial-quality, cold-rolled, carbon-steel sheet, complying with ASTM A 366 (ASTM A 366M); matte finish; suitable for exposed applications; and stretcher leveled or roller leveled to stretcher-leveled flatness.

B. Stainless-Steel Sheet: ASTM A 666, Type 302 or 304, stretcher leveled, No. 4 finish.

1. For perchloric acid fume hood linings and countertops, use Type 316L instead of Type 302 or 304.

C. Epoxy: Factory-molded, modified, epoxy-resin formulation, uniform mixture throughout, full thickness with smooth, nonspecular finish.

1. Physical Properties: Comply with the following minimum requirements:

a. Flexural strength: 15,000 psi.
b. Compressive strength: 30,000 psi.
c. Hardness (Rockwell M): 100.
d. Water absorption (24 hours): 0.02 percent (maximum).
e. Heat distortion point: 350 deg F.
f. Thermal-shock resistance: Highly resistant.

2. Flame Spread: 25 or less per ASTM E 84.
3. Chemical Resistance: Epoxy-resin material has the following ratings when tested with indicated reagents according to NEMA LD 3, test procedure 3.9.5:

a. Acetone: Moderate effect.
b. Acetic acid (98 percent): No effect.
c. Hydrochloric acid (37 percent): No effect.
d. Nitric acid (70 percent): No effect.
e. Phosphoric acid (85 percent): No effect.
f. Sulfuric acid (33 percent): No effect.
g. Benzene: No effect.
h. Butyl alcohol: No effect.
i. Carbon tetrachloride: No effect.
j. Ethyl acetate: No effect.
k. Ethyl ether: No effect.
l. Formaldehyde: No effect.
m. Phenol (85 percent): No effect.
n. Xylene: No effect.
o. Ammonium hydroxide (28 percent): No effect.
p. Sodium hydroxide (50 percent): Moderate effect.
q. Zinc chloride: No effect.

D. Tempered Glass: ASTM C 1048, Kind FT, Condition A, Type 1, Class 1, Quality q3.

2.3 FREE-STANDING FUME HOODS

A. Provide free-standing fume hoods designed to operate with a face velocity of 100 fpm (0.51 m/s) with sash fully open. As sash is closed, hood exhaust volume decreases and face velocity increases. With sash closed, hood maintains a slight negative pressure to confine fumes and gases.

1. Size (minimum): 72"wide by 32"deep by 80"high

B. Splay top and sides of face opening to provide an aerodynamic shape to ensure smooth, even flow of air into fume hood.

C. Variable Air Volume Control: Equip fume hoods with an electronic control unit with a sensing device that monitors face velocity and a motorized damper on the exhaust connection that maintains a constant face velocity by controlling air volume in response to control unit.

1. Provide output transmitter on electronic control unit that produces 0- to 10-V, dc signal proportional to fume hood exhaust volume for interface with building's HVAC control system.

2.4 FABRICATION

A. Steel Exterior: Fabricate from steel sheet, 0.0478 inch (1.2 mm) thick, with component parts screwed together to allow removal of end panels, front fascia, and airfoil, and to allow access to plumbing lines and service fittings. Apply finish to interior and exterior surface of component parts before final assembly.

B. Ends: Double-wall end panels without projecting corner posts or other obstructions to interfere with smooth, even airflow. Close area between double walls at front of fume hood and as needed to house sash counterbalance weights, utility lines, and remote-control valves.

C. Interior Lining: Unless otherwise indicated, provide fume hoods with linings of the following material:

1. Material: Stainless steel, 0.0500 inch (I .3 mm) thick

D. Stainless–Steel Lining Assembly: Welded unit consisting of end panel, top, and countertop; reinforced to form a rigid assembly to which exterior is attached.

1. For perchloric acid and radioisotope fume hood linings, cove comers and weld seams completely, grind smooth, and polish surfaces to produce uniform, directional textured, polished finish indicated, free of cross scratches. When polishing is completed, passivate and rinse surfaces, and remove foreign matter leaving surfaces chemically clean.

E. Rear Baffle: Provide baffle, of same material as fume hood lining, at rear of hood with adjustable openings at top and bottom for adjustment of airflow through

hood. Secure baffle to cleats at rear of hood with stainless-steel screws. Fabricate baffle for easy removal for cleaning behind baffle.

1. Provide control adjustment strips at top and bottom with plastic or stainless-steel knobs.
2. Provide remote-control adjustment from outside front of fume hood, where indicated.

F. Exhaust Plenum: Full width of fume hood and with adequate volume to provide uniform airflow from hood, of same material as hood lining.

1. Provide stainless-steel, epoxy-coated steel, or glass-fiber-reinforced polyester duct stub for exhaust connection.

G. Sash: Provide operable sashes of type indicated. Fabricate from 0.0500-inch- (1.3-mm-) thick stainless steel into 4-sided frame with bottom corners welded and finished smooth. Make top member removable for glazing replacement. Set glazing in chemical-resistant, U-shaped gaskets.

1. Glaze with 5-mm-thick tempered safety glass.
2. Counterbalance vertical sliding sash with sash weight and stainless-steel cable system. Provide ball-bearing sheaves, plastic glides in stainless-steel guides, and stainless-steel lift handles. Provide rubber bumpers at top and bottom of each sash unit.

H. Lights: Provide a vapor proof, 2-tube, rapid-start, fluorescent light fixture, of longest practicable length, complete with tubes at each fume hood. Shield tubes from hood interior by 1/4-inch- (6.35-mm-) thick laminated glass or 3-mm-thick tempered glass, sealed into hood with chemical-resistant rubber gaskets. Set units so fluorescent tubes are easily replaceable from outside of hood.

1. Provide fluorescent tubes with a color temperature of 3500 K and a minimum color rendering index of 85.
2. Base Cabinets: Comply with requirements of Laboratory Casework. "

J. Countertops and Cup Sinks: Unless otherwise indicated, provide countertops and cup sinks as follows:

1. Epoxy Tops: Fabricate with front overhang of I inch (25 mm) over base cabinets, formed with continuous drip groove on underside 1/2 inch (13 mm) from edge and with factory cutouts for sinks.

   a. Top Configuration: Flat, with square edges.
   b. top Thickness: 3/4 inch (19 mm).

2. Cup Sinks: 3-by-6-inch nominal size with 1-1/2-inch NPS (DN40) outlets with strainers and tailpieces a minimum of 6 inches, of the same material as sink, or as otherwise approved by Architect.
3. Unless otherwise indicated, provide epoxy tops and cup sinks.

K. Fasteners: Provide stainless-steel fasteners where exposed to fumes in hood.

2.5 ACCESSORIES

A. Service Fittings: Comply with requirements of Division 12 Section "Wood Laboratory Casework."

1. Provide service fittings with exposed surfaces, including fittings, escutcheons, and trim, finished with acid- and solvent-resistant, baked-on plastic coating in manufacturer's standard metallic brown, aluminum, or other color as approved by Architect.

B. Airflow Indicator: Provide fume hoods with airflow indicator of the following type:

1. Indicator Type: Direct-reading aneroid (Magnehelic-type) gage that measures fume hood exhaust duct static pressure as an indication of airflow.

C. Features: Provide 240 and 120-volt electrical outlets. Two base cabinets below. One cabinet shall be for flammable storage and one for acid storage.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General: Install fume hoods according to Shop Drawings and manufacturer's written instructions. Install plumb, level, aligned, and securely anchored to building and adjacent laboratory casework. Securely attach access panels but provide for easy removal and secure reattachment. Where hoods abut other finished work, apply filler strips and scribe for accurate fit with fasteners concealed where practical.

B. Comply with requirements of Division 15 and 16 Sections for installing water and laboratory gas service fittings, piping, electrical devices, and wiring. Install according to Shop Drawings and manufacturer's written instructions. Securely anchor fittings, piping, and conduit to fume hoods and casework, unless otherwise indicated.

3.2 ADJUSTING AND CLEANING

A. Adjust moving parts for smooth, near-silent, accurate sash operation with one hand. Adjust sashes for uniform contact of rubber bumpers. Verify that counterbalances operate without interference.

B. Repair or remove and replace defective work as directed on completion of installation.

C. Clean finished surfaces, including both sides of glass; touch up as required; and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

END OF SECTION

INDEX TO

SECTION 12 21 13 – HORIZONTAL LOUVER BLINDS

SECTION 12 21 13

HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following types of blinds and accessories:

1. Horizontal louver blinds with polymer slats.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.

B. Shop Drawings: Show location and extent of horizontal louver blinds. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other Work, operational clearances, and relationship to adjoining work.

C. Samples for Verification: For the following products, prepared on Samples from the same material to be used for the Work.

1. Louver Slat: Not less than 12 inches long.

D. Window Treatment Schedule: Include horizontal louver blinds in schedule using same room designations indicated on Drawings.

E. Product Certificates: For each type of horizontal louver blind product, signed by product manufacturer.

F. Maintenance Data: For horizontal louver blinds to include in maintenance manuals. Include the following:

1. Methods for maintaining horizontal louver blinds and finishes.
2. Precautions about cleaning materials and methods that could be detrimental to finishes and performance.
3. Operating hardware.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain horizontal louver blinds through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide horizontal louver blinds with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Flame-Resistance Ratings: Passes NFPA 701.

C. Corded Window Covering Product Standard: Provide horizontal louver blinds complying with WCMA A 100.1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver blinds in factory packages, marked with manufacturer and product name, and location of installation using same room designations indicated on Drawings and in a window treatment schedule.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 HORIZONTAL LOUVER BLINDS, POLYMER SLATS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Comfortex Window Fashions.
2. Hunter Douglas.
3. Levolor.
4. Springs Window Fashions Division, Inc.

B. Slats: Lead-free, UV-stabilized, integrally colored, opaque, permanently flexible, extruded PVC or polymer/wood alloy that will not crack or yellow; antistatic, dust-repellent treated; with manufacturer's standard profile.

1. Width: 2 inches.
2. Spacing: Manufacturer's standard.
3. Slat Finish: Color as indicated on Drawings.

C. Headrail: Formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and ends.

D. Bottom Rail: Manufacturers standard; with enclosed and protected ladders and tapes to prevent contact with sill.

E. Tilt Control: Consisting of enclosed worm gear mechanism and linkage rod, for the following operation.

1. Tilt Operation: Cord-operated tilter.

F. Lift Operation: Manual, cord lock; locks pull cord to stop blind at any position in ascending or descending travel.

G. Mounting: As indicated on Drawings, mounting permitting easy removal and replacement without damaging blind or adjacent surfaces and finishes; with spacers and shims required for blind placement and alignment indicated.

1. Provide intermediate support brackets if end support spacing exceeds spacing recommended by manufacturer for weight and size of blind.

H. Colors, Textures, Patterns, and Gloss: As selected by Architect from manufacturer's full range.

2.2 HORIZONTAL LOUVER BLIND FABRICATION

A. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.

1. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.

B. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F:

1. Blind Units Installed between (inside) Jambs: Width equal to 1/4 inch per side or 1/2 inch total, plus or minus 1/8 inch, less than jamb-to-jamb dimension of opening in which each blind is installed. Length equal to 1/4 inch, plus or minus 1/8 inch, less than head-to-sill dimension of opening in which each blind is installed.

C. Installation Brackets: Designed for easy removal and reinstallation of blind, for supporting headrail, and operating hardware, and for hardware position and blind mounting method indicated.

D. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to blind hardware and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.

E. Color-Coated Finish:

1. Metal: For components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

F. Component Color: Provide rails, cords, ladders, and exposed-to-view metal and plastic matching or coordinating with slat color, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 HORIZONTAL LOUVER BLIND INSTALLATION

A. Install blinds level and plumb and aligned with adjacent units according to manufacturer's written instructions and located so exterior louver edges in any position are not closer than 2 inches to interior face of glass. Install intermediate support as required to prevent deflection in headrail. Allow clearances between adjacent blinds and for operating glazed opening's operation hardware, if any.

B. Jamb Mounted: Install headrail flush with face of opening jamb and head.

C. Install horizontal louver blinds at window in Bathroom.

3.3 ADJUSTING

A. Adjust horizontal louver blinds to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean blind surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.

C. Replace damaged blinds that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION

INDEX TO

SECTION 12 35 53 – LABORATORY CASEWORK

SECTION 12 35 53

LABORATORY CASEWORK

PART 1 – GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American National Standards Institute (ANSI):

   a. A135.4, Basic Hardboard.
   b. Z358.I, Emergency Eyewash and Shower Equipment.

2. Americans with Disabilities Act (ADA).
3. APA-The Engineered Wood Association (APA): Grades and Specifications.
4. Architectural Woodwork Institute (AWI): Architectural Woodwork Quality Standards.
5. ASTM International (ASTM):

   a. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
   b. A507, Standard Specification for Steel, Sheet and Strip, Alloy, Hot-Rolled and Cold-Rolled, Drawing Quality.
   c. A666, Standard Specification for Austenitic Stainless-Steel Sheet, Strip, Plate, and Flat Bar.
   d. C1048, Standard Specification for Heat-Treated Flat Glass Kind HS, Kind FT Coated and Uncoated Glass.
   e. D1193, Standard Test for Reagent Water.
   f. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.

6. National Electrical Manufacturer's Association (NEMA):

   a. LD 3, High Pressure Decorative Laminates (HPDL).
   b. WD 1, General Requirements for Wiring Devices.

7. National Institute of Standards and Technology (NIST), Product Standard Section: PS 1, Construction and Industrial Plywood.
8. National Fire Codes-National Fire Protection Association (NFPA):

   a. 30, Flammable and Combustible Liquids, Section 4-3.
   b. 45, Fire Protection for Laboratories Using Chemicals.
   c. 70, National Electrical Code (NEC).

9. Occupational Safety and Health Administration (OSHA): General Industry Standards, Section 1910.106.

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Completely describe and illustrate design features, materials, fabrication, and casework layout including rough-in details for plumbing, electrical, and ventilation connections.

    a. Key units to Contract Document designations.
    b. Provide details and dimensions not controlled by job conditions.
    c. Show required field measurements beyond manufacturer's control.
    d. Establish and maintain applicable rough-in and field dimensions.
    e. Descriptive literature and manufacturer's specifications of casework, hardware, service fixtures, and specialty items.
    f. Brochures, catalogs, installation instructions, and operations and maintenance manuals.
    g. Clearly mark with Contract Document designation each proposed item in manufacturer's literature.
    h. Coordinate Shop Drawings with other trades.
        1. Seismic anchorage and bracing drawings and data sheets, as required by manufacturer.
        2. Samples:
            a. Finished color Samples of each finish proposed by casework manufacturer.
            b. Sample unit, complete with hardware, including locks, accessories, and top for Owner's inspection and 1 month's use. Unit, except top, may be used on Project.

B. Informational Submittals:

1. Seismic anchorage and bracing calculations as required by code and casework manufacturer.
2. Qualifications of manufacturer and installation lead person.

1.03 QUALITY ASSURANCE

A. Standards:

1. Casework: Conform to "Architectural Woodwork Quality Standards" of Architectural Woodwork Institute (AWI), Premium grade.

B. Casework Manufacturer Qualifications:

1. Reputation for doing satisfactory work on time.
2. Successful completion of comparable work.
3. Specialization in design and manufacture of plastic laminate casework or furnishings for scientific laboratories.
4. Operation of adequate size factory devoted to manufacture of plastic laminate laboratory casework or furnishings.
5. Minimum 5 years' experience in manufacture of quality and type of laboratory casework and furnishings specified.
6. Warranty is for 3 years from date of installation.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver materials to Project Site until excessive moisture is out of building for at least 10 days.

B. Store casework inside in dry and well-ventilated areas, and do not subject to extreme changes in temperature or humidity.

C. Coordinate delivery and installation with Engineer. Owner may wish to inspect items in Contractor's presence to verify condition.

PART 2 – PRODUCTS

2.01 CASEWORK MANUFACTURERS

A. Plastic laminate faced casework of the following manufacturers, meeting these Specifications, may be used on this Project:

1. Laboratory Design & Supply, Buford, Ga. Phone 770932-1118
2. Campbell Rhea, Paris, TN.
3. Nolen Products, Knoxville, TN.
4. LSI Corp., Minneapolis, MN.

2.02 CASEWORK MATERIALS

A. Plywood: APA exterior type conforming to NIST, Product Standard Section, PS 1.

1. Thickness: Minimum 3/4 inch.
2. Grade: No knots or voids present on surfaces. Use marine grade for cabinet bases or pressure treated wood.

B. Hardboard:

1. Wood fibers and resin binder molded under high pressure.
2. Thickness: Minimum 1 – 1/4 inch.
3. Premium grade.
4. Tensile Strength: 3;500 psi.
5. Shear Strength: 4,500 psi.
6. ANSI A135.4, Type II, Surface 2, Finish A, Design A.

C. Plastic Laminate:

1. High-pressure plastic laminate for Special Cabinets defined in Article Casework Fabrication of this section, excluding counter tops.
2. Thickness: 0.051 plus or minus 0.005 inch.
3. Stain Resistance: Show essentially no effect for materials I through 23 and moderate effect for materials 24 through 29 when tested according to NEMALD3.
4. Finish and Color: Submit to owner for selection.

5. Manufacturer and Product: Wilsonart; Tufsurfll.

D. Edge Banding:

1. Minimum 3-mm thick polyvinyl chloride for drawer and door fronts and cabinet box.
2. I-mm edging on all other edges.
3. Color: Selected by Engineer from manufacturer's standard colors.

E. Hardware:

1. Door Locks: BHMA A156.11, E07121; keyed to match existing locks.
2. Drawer Locks: BHMA A156.11, E07041; keyed to match existing locks.
3. Hinges: Concealed type, minimum 120-degree opening with spring closer.
4. Pulls: Manufacturer's standard semi flush type of molded ABS plastic in color selected by Engineer from manufacturer's standard colors.
5. Shelf Fasteners: Metal or plastic design providing rigid and true shelf alignment.
   Metal: Dull chrome finish.
— Plastic: Match cabinet interior color.
6. Drawer Slides: Epoxy coated.
— Metal designed to mate with drawer slides in cabinets.
— Provide smooth sliding action.
— Load Support on Extended Drawer: 150 pounds in file drawers, 75 pounds in drawers 6 inches and less in depth, and 100 pounds in other drawers.

F. Accessories: Manufacturer's standard catches, grommets, and other accessories and trim required to complete installation in secure and rigid manner. Finish to match other exposed hardware.

G. Adhesives: Manufacturer's standard water-resistant adhesives.

H. Counter Tops:

1. Epoxy Resin at Lab Area:
   a. Molded, modified, solid epoxy resin.
   b. Formulated to produce smooth, nonabsorbent, chemical-, heat-, and shock-resistant surface.
   c. Homogeneous in color and texture.
   d. Thickness: Minimum 1 inch.
   e. Drip groove under front edge.
   f. Integral two-piece glued backsplash for full length of adjoining walls.
   g. Color: **Black**
   h. Manufacturers and Products:
      1) Durcon; Durcon Resin.
      2) Laboratory Tops; Epoxy Resin.
      3) Prime; Prime-Resin.

2. Plastic Laminate at Work Station.

   a. Finish and Color: As shown in Interior Finish Schedule.

I. Backsplashes, Backsplash Returns, Splash Curbs (SCB), Reagent Shelves, and Reagent Shelf Supports: Same material as adjacent counter top.

J. Electrical installation and materials shall comply with the requirements of Electrical Division.

2.03 LABORATORY EPOXY RESIN SINK LSK-I (IF SHOWN ON PLANS)

A. Description:
1. Single Compartment: One-piece, molded epoxy resin with coved corners and corner outlet.
2. Size: 24 inches long by 16 inches wide by 8 inches deep interior dimensions.
3. Epoxy resin sink drain outlet complete with removable strainer, stopper, and 1 – 1/2-inch tailpiece.

B. Manufacturers and Products: Drop-In Type Sink: Durcon; Model No. D-55.

2.04 LABORATORY SERVICE FIXTURES

A. General: Protect chrome plumbing service fixtures with white epoxy enamel coating applied by manufacturer's electrostatic powder coating process.

B. Deck Mounted Mixing Faucet LP-I:

1. Swing gooseneck with 8-inch spread, vacuum breaker, and removable aerator.
2. Index for hot and cold water.
3. Manufacturers and Products:
   a) Chicago; Model No. 930 with 8-inch spread.
   b) Water Saver; Model No. L-4I2-8VB.

2.05 CASEWORK FABRICATION

A. Construct casework of plywood covered with laminated plastic sheets on both surfaces.

B. Furnish manufacturer's standard modular units conforming as closely as possible to dimensions shown on Drawings, or specially made casework units where standard sized units do not conform to dimensions and configurations shown on Drawings.

C. Construct casework with face screwed fasteners. Do not depend on mechanical fastening, gluing, or screwing of core edges for strength.

D. Excluding countertops, fabricate cabinet surfaces (fronts, backs, sides, tops, bottoms, shelves, doors, drawer fronts, bases, and fillers) with minimum 3/4-inch thick plywood covered with plastic laminate on both sides bonded by polyester resin at high pressure and temperature. Seal and protect cabinet and drawer surfaces from water intrusion. Drawer and door fronts to be covered with Chemical Resistant laminate. Drawer bottoms are to be wood-laminate is not

acceptable. All backs are to be removable; 3-mm edge on drawers, doors and cabinet box; I-mm edge on all other edges.

E. Radius exposed corners at least 1-1/4 inch.

F. Protect edges from water intrusion including edges not exposed to view, e.g. resting on base, sitting on floor, standing behind cabinet. Install vinyl edges on exposed edges of cabinets, doors, and drawers. Locate joints in vinyl edges where least noticeable. Bond under pressure with waterproof hot melt glue and finish with smooth, radiused edges, and corners.

G. Cabinet Bases:

1. Design and construct separately from side and back panels to support cabinets rigidly in true alignment.
2. Material: Marine grade exterior plywood or treated wood.
3. Height: 4 inches.
4. Install adjustable leveling feet at each corner and at intermediate points necessary for rigid support.

H. Backsplashes and Splash Curbs: Field glued.

I. Access Panels: Removable units opening to pipe space behind cases at knee spaces, balance tables, ends of islands and peninsulas, and elsewhere for access.

J. Sliding Glass Doors: Frameless type in wall-mounted or double-sided island or peninsula-mounted cases. Framed type for tall storage cabinets and base cabinets.

K. Cabinet Locks CLK: Doors and drawers where shown on Drawings.

L. Color: Countertops, fronts, trim, and other exposed surfaces as selected by Engineer from manufacturer's standard colors

M. Wood Drawers: Construct in accordance with AWI Premium.

N. Flammable Liquid or Acid Storage Cabinets, F/A:

1. Fabricate in length, width, and height shown on Drawings according to Flammable Liquid or Acid Storage Cabinet Detail.
2. Construct in accordance with regulations:
   a) OSHA, Section 1910.106.
   b) NFPA 30, Section 4-3.
3. 1-inch APA exterior grade plywood around, rabbeted joints fastened in two directions with flathead wood screws, and rabbeted overlap of at least 1 inch when two doors are shown on Drawings.
4. Self-closing doors and means of latching.
5. Hinged to hold when subjected to fire.
6. Raised sill in bottom capable of holding 2-inch depth of spilled liquid.
7. Shelf to limit maximum containers capacity to 1 gallon, in accordance

with NFPA 45, Section 7.2.3.
Label cabinet laminate front "Acids Only".

8. Except for BCV, no penetrations for plumbing, electrical, or other utilities.

PART 3 – EXECUTION

3.01 INSPECTION AND PREPARATION

A. Make field measurements of items or conditions affecting casework, equipment, and furnishings.

B. Examine grounds and supports of casework to assure adequate anchorage, free of foreign material, moisture, and unevenness that would prevent quality casework installation.

C. Verify that ventilation outlets, service connections, and supports are correct and in proper location.

D. Identify and correct defects before proceeding with installation.

3.02 INSTALLATION

A. Use proper type of anchoring devices for materials encountered.

B. Install in accordance with manufacturer's instructions.

C. Except where noted, install in new and ready-to-use condition.

D. Cut, fit, patch, and provide support where required for proper and complete installation.

E. Casework:

1. Secure casework in place in true alignment, level, and plumb. Secure casework units to cleats anchored to building structure or wall framing. Install wall-hung cabinets to firmly and rigidly support cabinet weight plus normally expected cabinet content weight.
2. Fasten together adjoining cabinets in an assembly joined at top and bottom of front and back with bolts placed inconspicuously inside cabinets.
3. Close exposed-to-view openings larger than joints with filler of same material and finish as adjacent casework. Secure filler to casework with concealed screws. Use minimum width and number of fillers consistent with need. Except where shown on Drawings, do not use filler panels (FPL) exceeding 6-inch width.
4. Install cabinet front face 3 inches in front of cabinet base face to provide toe space.

F. Countertops:

1. Install standing height countertop's working surface 36 inches above

finished floor. Install desk height countertop's working surface 30 inches above finished floor.

2. Install level to within 1/16 inch in 10 feet and in largest possible increments.
3. Where not supported by base cabinets or other furnishings, use brackets or other support on minimum 3-foot centers.
4. Make joints with manufacturer-provided cement containing same color and chemical-resistance characteristics as top material. Leave joints smooth and in same plane as top.

G. Laboratory Sinks and Service Fixtures:

1. Install in countertops and cases in manner recommended by manufacturer.
2. Take care to avoid scratches and other damage to cases and countertops.
3. Install ready for connection of services.

H. Furnishings:

1. Provide equipment with connection terminals for plumbing, gas, steam, electrical, ventilation, and refrigeration service connections where required.
2. Where items are supplied without line cords, furnish line cord and plug compatible with electrical service and available outlets.

3.03 ADJUSTING AND CLEANING

A. Adjust hardware and leave in smooth, easy condition. Remove protective maskings. Clean surfaces ready for use. Restore stained or discolored finishes or replace item.

B. Inspect, adjust, clean, and test service fixtures to assure intended operation.

END OF SECTION

INDEX TO SECTION 13 34 19 – METAL BUILDING SYSTEMS

SECTION 13 34 19

METAL BUILDING SYSTEMS

PART 1 – GENERAL

1.1 **SECTION INCLUDES-** (This Section can be used for Sludge dewatering building, Crane Canopy roof and framing, UV system Canopy, D.O Canopy, and Sludge Transfer Canopy)

A. Metal Framing Components

B. Metal Wall Panels and Trim

C. Metal Roof Panels and Trim

D. Metal Building Accessories

1.2 RELATED SECTIONS

A. Section 03 30 00- Cast-in-place concrete.

B. Section 05 21 00 - Steel joist framing.

C. Section 05 31 00 - Steel decking.

D. Section 08 31 00 - Overhead doors.

E. Section 08 54 13 - Windows.

F. Section 09 90 00 - Painting: Finish painting of primed steel surfaces.

1.3 REFERENCE STANDARDS

A. American Institute of Steel Construction (AISC):

1. AISC Specification for Structural Steel Buildings.
2. AISC Serviceability Design Considerations for Low-Rise Buildings

B. American Iron and Steel Institute (AISI):

1. AISI North American Specification for the Design of Cold-Formed Steel Structural Members

C. American Welding Society (AWS):

1. AWS D1.1 / D1.1M – Structural Welding Code – Steel.

2. AWS D1.3 / D1. 3M – Structural Welding Code – Sheet Steel

D. Association for Iron & Steel Technology (AISE):

1. AISE 13 – Specifications for Design and Construction of Mill Buildings.

E. ASTM International (ASTM):

1. ASTM A 36 – Standard Specification for Carbon Structural Steel
2. ASTM A 48 – Specification for Gray Iron Castings
3. ASTM A 123 – Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
4. ASTM A 307 – Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength
5. ASTM A 325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
6. ASTM A 354 – Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners
7. ASTM A 475 – Specification for Zinc-Coated Steel Wire Strand
8. ASTM A 490 – Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
9. ASTM A 500 – Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
10. ASTM A 529 – Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
11. ASTM A 563 – Specification for Carbon and Alloy Steel Nuts
12. ASTM A 572 – Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
13. ASTM A 653 / A 653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
14. ASTM A 792 / A 792M – Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
15. ASTM A 992 – Standard Specification for Structural Steel Shapes.
16. ASTM A 1011 – 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.
17. ASTM A 1039 – Specification for Steel, Sheet, Hot Rolled, Carbon, Commercial, Structural, and High-Strength Low-Alloy, Produced by Twin-Roll Casting Process
18. ASTM E 96 / E 96M – Standard Test Methods for Water Vapor Transmission of Materials.
19. ASTM E 108—Spread-of Flame Testing: Class 1A Rating.
20. ASTM E 283 – Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
21. ASTM E 331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
22. ASTM E 1592 – Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference

23. ASTM E 1646 – Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference
24. ASTM E 1680 – Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems
25. ASTM E 2140 – Test Method for Water Penetration of Metal Roof Panel Systems by Static Water Pressure Head
26. ASTM F 436 – Specification for Hardened Steel Washers
27. ASTM F 1145 – Specification for Turnbuckles, Swaged, Welded, Forged
28. ASTM F 1554 – Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

F. IAS – International Accreditation Service

G. LGSI – Light Gauge Steel Institute

H. SJI – Steel Joist Institute

I. FM Global:

1. FMRC Standard 4471 – Approval Standard for Class 1 Roofs for Hail Damage Resistance, Combustibility, and Wind Uplift Resistance.

J. Metal Building Manufacturers Association (MBMA):

1. MBMA Metal Building Systems Manual

1.4 DEFINITIONS

A. Metal Building System: A building system that will employ:

1. Either continuous or simple-span 'Z' or 'C'-shaped cold-formed purlins or open-web steel joists for support of the roof cladding.
2. Simple-span 'Z' or 'C'-shaped cold-formed purlins or open-web steel joists for support of the steel wall cladding.
3. Three-plate, built-up rigid space frames and/or cold-formed 'C' or hot-rolled I-shaped post-and-beam framing to support the roof and wall secondary members.
4. All systems (cladding, roof and wall secondary, lateral primary framing, and longitudinal bracing) work together to provide resistance to vertical and lateral loading demands.

B. Gable Symmetrical: A continuous frame building with the ridge in the center of the building, consisting of tapered or straight columns and tapered or straight rafters. The sidewall girts may be continuous (by-passing the columns) or simple span (inset in the column line). The rafters may or may not have interior columns.

C. Gable Asymmetrical: A continuous frame building with an off-center ridge, consisting of tapered or straight columns and tapered or straight rafters. The eave height and roof slope may differ on each side of the ridge. The sidewall girts may be continuous (by-passing the columns) or simple span (flush in the column line). The rafters may or may not have interior columns.

D. Single-Slope: A continuous frame building which does not contain a ridge but consists of one continuous slope from side to side. The building consists of straight or tapered columns and tapered or straight rafters. The sidewall girts may be continuous (by-passing the columns) or simple span (flush in the column line). The rafters may or may not have interior columns.

E. Lean-To (LTO): A building extension, which does not contain a ridge, but consists of one continuous slope from side to side. These units usually have the same roof slope and girt design as the building to which they are attached and supported by.

F. Roof Slope: Pitch expressed as inches of rise for each 12" of horizontal run.

G. Building Width: Measured from outside to outside of sidewall secondary structural member (girt).

H. Building Eave Height: A nominal dimension measured from the finished floor to top flange of eave strut.

I. Building Length: Measured from outside to outside of endwall secondary structural member.

J. Auxiliary Loads: Dynamic loads induced by cranes, conveyors, or other material handling systems.

K. Collateral Loads: The weight of any non-moving equipment or material, such as ceilings, electrical or mechanical equipment, sprinkler systems, plumbing, or ceilings shall be 3- 5 LB per SF.

L. Roof Live Loads: Loads produced by maintenance activities, rain, erection activities, and other movable or moving loads but not including wind, snow, seismic, crane, or dead loads.

M. Roof Snow Loads: Gravity load induced by the weight of snow or ice on the roof, assumed to act on the horizontal projection of the roof.

N. Seismic Loads: Loads acting in any direction on a structural system due to the action of an earthquake.

O. Wind Loads: The loads on a structure induced by the forces of wind blowing from any horizontal direction.

1.5 DESIGN REQUIREMENTS

A. General

1. The building manufacturer will use standards, specifications, recommendations, findings and/or interpretations of professionally-recognized groups such as AISC, AISI, AWS, ASTM, CSA, CWB, MBMA, Federal Specifications, and unpublished research by MBMA as the basis for establishing design, drafting, fabrication, and quality criteria, practices,

and tolerances. The Manufacturer's design, drafting, fabrication and quality criteria, practices, and tolerances shall govern, unless specifically countermanded by the contract documents.

2. Design structural mill sections and built-up plate sections in accordance with:

   a. (US) code-appropriate edition of AISC's "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings", ANSI/AISC 360 ASD method.
   b. (Canada) CSA S16, "Design of Steel Structures", latest edition.

3. Cold-Formed steel structural members and panels will generally be designed in accordance with "Specifications for the Design of Cold-Formed Steel Structural Members", 2007 Edition, ANSI/AISI S-100-07 or CAN CSA S136-07.
4. Design weldments per the following:

   a. Structural Welding

      1) (US) Design per AWS D1.1, "Structural Welding Code – Steel", Latest Edition.
      2) (Canada) Design per CWB W59, "Welded Steel Construction (Metal Arc Welding)", Latest Edition.

   b. Cold-Formed Welding

      1) (US) Design per AWS D1.3, "Structural Welding Code – Sheet Steel", Latest Edition.
      2) (Canada) Design per CWB W59, "Welded Steel Construction (Metal Arc Welding)", Latest Edition.

B. Design Code:

1. Structural design for the building structural system shall be provided by the metal building system manufacturer for the following design criteria:
   a. Governing Building Code: GSBC.
   b. Year/Version: 2014
   c. Occupancy Category:

C. Design Loads:

Design loads shall be as specified on structural drawings General Notes S1.0 and S1.1.

D. General Serviceability Limits:

1. Deflection Limits shall be in accordance with the applicable provisions of the Metal Building Systems Manual (MBMA), latest edition.
2. Vertical Deflections:
   a. Roof Secondary (Purlins) – L/150.

b. Main Frame roof beams – L/180.

3. Horizontal Deflections:
   a. Wall Secondary (Girts) – L/90.
   b. Main Frames – H/90.
4. Vertical deflection limits apply for snow load (50-year mean-recurrence interval) plus collateral load, or the code required live load. The horizontal drift and deflections limits apply for the loads induced by a basic wind speed corresponding to a 10 year mean-recurrence interval.

1.6 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Provide complete erection drawings for the proper identification and assembly of all building components. Drawings will show anchor bolt settings, transverse cross-sections, sidewall, endwall and roof framing, flashing and sheeting, and accessory installation details.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, representing actual product, color, and patterns.

F. Certifications: Shop drawings and design analysis shall bear the seal of a registered professional engineer upon request. Design analysis shall be on file and furnished by manufacturer upon request.

G. Bill of Materials: Bills of material shall be furnished and shall include item weights.

H. Preventative Maintenance Manual.

I. Welder's Certifications: Certification of welder qualifications shall be furnished as specified by the Project Engineer.

1.7 QUALITY ASSURANCE

A. Manufacturer / Fabricator Qualifications:

1. (US) All primary products specified in this section will be supplied by a single IAS AC 472 Accredited Manufacturer /Fabricator with a minimum of five (5) years' experience.

B. Weldments/Welder/Weld Inspection Qualifications:

1. (US) Welding inspection and welding inspector qualification for structural steel shall be in accordance with AWS D1.1, "Structural Welding Code – Steel", latest edition. Welding inspection and welding inspector qualification for cold-formed steel shall be in accordance with AWS D1.3, "Structural Welding Code – Sheet Steel", latest edition.

C. Erector Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified.

D. Design: Standard drawings and design analysis must bear the seal of a registered professional engineer. Design analysis must be on file and furnished by manufacturer upon request.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling Requirements:

1. Store and handle materials in accordance with manufacturer's instructions.
2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
3. Do not store materials directly on ground.
4. Store materials on flat, level surface, raised above ground, with adequate support to prevent sagging.
5. Protect materials and finish during storage, handling, and installation to prevent damage.

C. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

D. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.9 WARRANTY

A. Building System Warranty

1. Furnish manufacturer's standard warranty for the metal building system, excluding paint.

2. The manufacturer shall warranty the metal building system against failure due to defective material or workmanship for a period of one (1) year from date of shipment.
3. The liability under this warranty shall be limited to furnishing, but not dismantling or installing, necessary replacement material F.O.B. manufacturer's plant. In no event shall the manufacturer be liable for loss of profits, or other incidental, consequential, or special damages.

B. Roof and Wall Paint Finish Warranty

1. Paint Systems

a. Furnish manufacturer's standard warranty for the metal panel paint system against chipping, peeling, blistering, fading in excess of 5 NBS Hunter units as set forth in ASTM-D-2244, and chalking in excess of 8 units as set forth in ASTM-D-4214.
b. The warranty shall be for a period of 30 years from the date of shipment for PVDF paint systems.
c. The warranty shall be for a period of 25 years from the date of shipment for silicone-polyester paint systems.

2. Galvalume® systems

a. Furnish manufacturer's standard warranty for the Galvalume® panels against rupture, structural failure, or perforation due to normal atmospheric conditions.
b. The warranty shall be for a period of 20 years from the date of shipment for Galvalume® systems.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Nucor Building Systems or equivalents

2.2 MATERIALS **(All Primary, Secondary and other Misc. Framing shall be Hot Dip Galvanized)**

A. Primary Framing Steel:

1. Steel for hot rolled shapes must conform to the requirements of ASTM Specifications A-36, A-572 or A-992, with minimum yield of 36 or 50 ksi, respectively.
2. Steel for built-up sections must conform to the requirements of ASTM A-1011, A-1018, A-529, A-572 or A-36 as applicable, with minimum yield of 42, 46, 50, or 55 ksi as indicated by the design requirements.
3. Round Tube must conform to the requirements of ASTM A-500 Grade B with minimum yield strength of 42 ksi.

4. Square and Rectangular Tube must conform to the requirements of ASTM A-500 Grade B with a minimum yield strength of 46 ksi.
5. Steel for Cold-Formed Endwall "C" sections must conform to the requirements of ASTM A-1011 or A-1039 Grade 55, or ASTM A-653 Grade 55 with minimum yield strength of 55 ksi.
6. X-bracing will conform to ASTM A-36 or ASTM A-529 for rod and angle bracing or ASTM A-475 for cable bracing.

B. Secondary Framing Steel:

1. Steel used to form purlins, girts and eave struts must meet the requirements of ASTM A-1011 or ASTM A-1039 Grade 55 for primed material or ASTM A-653 Grade 55 for galvanized material with a minimum yield of 55 ksi.
2. Design Thicknesses – Gauge to be determined by design to meet specified loading conditions.

C. Panels:

1. Roll-formed Galvalume®, pre-painted Galvalume® or Galvanized G90 Exterior-Side and G60 Interior-Side. In Canada, Galvanized panel will have a coating thickness of G90 on both sides.
2. Standing Seam Panels must have:

   a. (For US and Export) 50 percent minimum aluminum-zinc alloy-coating and conform to ASTM A-792 or ASTM A-653 with a minimum yield of 50 ksi.
   b. (For Canada) 55 percent minimum aluminum-zinc alloy-coating with Galvalume® finish or 50 percent minimum aluminum-zinc alloy- coating with paint finish and conform to ASTM A-792or ASTM A-653 with a minimum yield of 50 ksi.

3. Through-fastened panels must have:

   a. 50 percent minimum aluminum-zinc alloy coating and conform to ASTM A-792 or ASTM A-653 with a minimum yield of 50 ksi.

4. Panel Finish:

   a. SP Finish: Modified Siliconized Polyester paint system with a 25-year finish warranty.
   b. PVDF Finish: 70% PVDF paint system with a 30-year finish warranty.

D. Panel Fasteners:

1. For Galvalume® and Painted finished roof panels: Long Life Cast Zinc head.
2. For wall panels: Coated carbon steel.
3. Color of exposed fastener heads to match the wall and roof panel finish.
4. Concealed Fasteners: Self-drilling type, of size required.

E. Flashing and Trim: Match material, finish, and color of adjacent components. Provide trim at rakes, including peak and corner assemblies, high and low eaves, corners, bases, framed openings and as required or specified to provide weathertightness and a finished appearance.

F. Roof Clips:

1. All clips must have factory-applied mastic and designed so that movement between the panel and the clip does not occur.
2. Short or Tall Fixed clips; shall be either 3 ½ inches (89mm) or 4 ½ inches (114mm) in height. Used for applications where only a moderate amount of thermal expansion and contraction in the roof panel is expected.
3. Short or Tall Sliding clips: shall be either 3 ½ inches (89mm) or 4 ½ inches (114mm) in height and provide either 1-7/8 inches or 3 7/8 inches of travel for panel thermal expansion and contraction, depending on clip choice.

G. Sealant & Closures:

1. Sidelaps: Factory applied non-skinning Butyl mastic.
2. Endlaps, Eave, Ridge Assembly, and Gable Flashings: Field applied 100% solids butyl-based elastomeric tape sealant, furnished in pre-cut lengths.
3. Outside Closures: Closed-cell, plastic or metal
4. Inside Closures: Closed-cell, plastic or metal

2.3 PRIMARY FRAMING

A. Rigid Frames: Fabricated as welded built-up "I" sections or hot-rolled sections.

1. Frame Design: Gable Symmetrical.
2. Frame Design: Gable Unsymmetrical.
3. Frame Design: Single Slope.
4. Frame Design: Lean-To.
5. Frame Type: Clear-Span.
6. Frame Type: Multi-Span.

B. Rigid Frame Columns:

1. Straight/Uniform depth
2. Tapered

C. Rigid Frame Rafters:

1. Straight/Uniform depth
2. Tapered

D. Endwall Frames / Roof Beams: Fabricated as mill-rolled sections or built-up "I" sections depending on design requirements. Fabricate endwall columns of cold-formed "C" sections, mill-rolled sections, or built-up "I" sections depending on design requirements.

E. Interior Columns: Columns supporting rafters of mainframes shall be of the following cross-section type(s):

1. Pipe (Round HSS).
2. Tube (Square HSS).
3. "I"-Shaped (Built-Up or Mill-Rolled depending on design requirements).

F. Finish: Red-Oxide or Gray Primer, or galvanized (pre-coated galvanized cold-form, hot-dipped otherwise).

G. Field Bolted Connections: All field bolted connections shall be designed and detailed utilizing ASTM A-325 or A-490 depending on design requirement.

2.4 SECONDARY FRAMING

A. Purlins and Girts: Purlins and girts shall be cold-formed "Z" sections with stiffened flanges. Flange stiffeners shall be sized to comply with the requirements of the latest edition of AISI and LGSI. They shall be pre-punched at the factory to provide for field bolting to the rigid frames. They shall be simple or continuous span as required by design. Connection bolts will install through the purlin/girt webs, not purlin/girt flanges.

B. Purlins (Excluding Open Web Joists): Horizontal structural members which support roof coverings.

1. Depth: To be determined by design (8", 10" or 12")
2. Maximum Length: To be determined by design.
3. Finish: Red Oxide Primer.
4. Finish: Gray Primer.
5. Finish: Pre-Coated Galvanized.

C. Girts: Horizontal structural members that support vertical panels.

1. Depth: To be determined by design (8", 10", or 12")
2. Maximum Length: To be determined by design.
3. Finish: Red Oxide Primer.
4. Finish: Gray Primer.
5. Finish: Pre-Coated Galvanized.

D. Eave Struts: Unequal flange, cold-formed "C" sections or "Z" purlins.

1. Depth: To be determined by design (8", 10" or 12")
2. Maximum Length: To be determined by design.
3. Finish: Red Oxide Primer.
4. Finish: Gray Primer.
5. Finish: Pre-Coated Galvanized.

E. Base Framing: Base members to which the base of the wall covering may be attached to the perimeter of the slab. Secured to the concrete slab with mechanical anchors.

1. Formed base sill.
2. Base channel.

a. With flashing.
b. Without flashing.

3. Base angle.

a. With flashing.
b. Without flashing.

4. Base girt.

a. With flashing.
b. Without flashing.

5. Finish: Red Oxide Primer.
6. Finish: Gray Primer.
7. Finish: Pre-Coated Galvanized.

F. Building Systems roof joist system.

1. Open web, parallel chord, simple span load carrying members suitable for the direct support of roof systems utilizing material sizes and yield strengths as required.
2. ClearBay™ roof joist system with reduced bridging on qualified "CFR" projects.
3. Bridging

a. All Bolted
b. Welded

4. Joist attachment

a. Welded
b. All Bolted (No welding required)
c. Alt. Bolted (Some welding required)

5. Open web members shall be fabricated of material that conforms to the material specifications designated by the Steel Joist Institute as acceptable for this product.

2.5 ROOF PANELS

A. Roof Panel: A through-fastened roof with 1 1/4-inch (32mm) ribs at 12 inches (305mm) on center. The area between the ribs is reinforced to minimize oil-canning.

1. Gauge: 26 (Std.).
2. Dimensions: 36 inches (915mm) wide by 1 1/4 inch (32mm) high.
3. Finish/Color: As specified in Article 2.8 PANEL FINISH.

2.6 WALL PANELS

A. Wall Panel: A through-fastened sidewall panel with 1 1/4-inch (32mm) ribs at 12 inches (305mm) on center. The area between the ribs is reinforced to minimize oil-canning.

1. Gauge: 26 (Std.).
2. Dimensions: 36 inches (915mm) wide by 1 1/4 inch (32mm) high.
3. Finish/Color: As specified in Article 2.8 PANEL FINISH.

2.7 ACCESSORIES

A. Canopies: Overhanging or projecting roof structures off the sidewall or endwall with the extreme end usually unsupported. For aesthetic application or to cover entrance or walkway.

B. Roof Line Trim:

1. Trim Type: Simple Eave/Rake Trim.
2. Trim Type: Sculptured Eave/Rake Trim.
3. Trim Type: Low-Eave Gutter / Sculptured Rake Trim.

C. Purlin Extensions: Overhanging or projecting roof structure at the end of a building.

D. Framed Openings: Used to frame out doors, windows, louvers, and any other openings. Refers to the framing members and flashing which surround an opening and includes jambs, header and or sill, trim, and fasteners.

E. Walk Doors: Personnel entry doors.

1. Size: As noted on the Contract Drawings.
2. Accessories: As noted on the Contract Drawings
3. Size: 3 foot by 7 foot (914x2133mm) Single Leaf.
4. Size: 4 foot by 7 foot (1219x2133mm) Single Leaf.
5. Size: 6 foot by 7 foot (1828x2133mm) Double Leaf.

F. Windows: Self-flashing, self-framing horizontal slide or fixed narrow-lite windows.

1. Type / Size: As noted on the Contract Drawings.
2. Type: Fixed Glass
   a. Size: 2 foot by 6 foot (610x1828mm).
   b. Size: 4 foot by 4 foot (1219x1219mm).
   c. Size: 5 foot by 4 foot (1524x1219mm).

3. Type: Horizontal Slide
   a. Size: 3 foot by 3 foot (914x914mm).
   b. Size: 4 foot by 3 foot (1219x914mm).
   c. Size: 4 foot by 4 foot (1219x1219mm).
   d. Size: 5 foot by 3 foot (1524x914mm).
   e. Size: 6 foot by 3 foot (1828x914mm).

G. Translucent Roof and Wall Panels: Translucent Acrylit™ panels consisting of 8 oz. 100% acrylic translucent panel woven roving strand combined with chopped strand matrix fiberglass reinforcement. White in color with a minimum of 55-60 percent light transmittance. U/L 90 rated panel available. Allows natural light into the building.

H. Liner Panels: A through-fastened sidewall panel with 1 1/4-inch (32mm) ribs at 12 inches (305mm) on center. The area between the ribs is reinforced to minimize oil-canning.

1. Gauge: 26.
2. Dimensions: 36 inches (915mm) wide by 1 1/4 inch (32mm) high.
3. Finish: As specified in Article 2.8 PANEL FINISHES.

I. Soffit Panels:

1. Wall Panel: A through-fastened sidewall panel with 1 1/4-inch (32mm) ribs at 12 inches (305mm) on center. The area between the ribs is reinforced to minimize oil-canning.

a. Gauge: 26 (std.).

J. Roof Vents: Accessories used on the roof to allow air to pass through.

1. Gravity Ridge Vents: Can be used as single unit or continuous.

a. Size: 9 inch by 10 foot (229x3048mm) with Damper & Lockerpull.
b. Size: 12 inch by 10 foot (305x3048mm) with Damper & Lockerpull.

K. Pipe Flashings: Aluminum base with EPDM boot. The base flange must bend to form a seal with surface irregularities or roof pitch.

1. Size: ¼" to 4" (6 to 102mm) Pipe
2. Size: 4" to 7" (102 to 178mm) Pipe
3. Size: 7" to 13" (178 to 330mm) Pipe

2.8 PANEL FINISHES

A. Roof Panel:

1. Galvalume® (GM)

B. Wall Panel:

1. Standard Panel Paint System (Siliconized Polyester Resin, 25-year Finish Warranty):

a. Color: Burnished Slate (BS)
b. Color: Evergreen (EG)
c. Color: Aztec Blue (AB)

d. Color: Brick Red (BR)
e. Color: Sagebrush Tan (SB)
f. Color: Fox Gray (FG)
g. Color: Lightstone (LS)
h. Color: Polar White (PW)

C. Liner Panel:

1. Standard Panel Paint System (Siliconized Polyester Resin, 25-year Finish Warranty):

a. 26: gauge
1) Color: Burnished Slate (BS)
2) Color: Evergreen (EG)
3) Color: Aztec Blue (AB)
4) Color: Brick Red (BR)
5) Color: Sagebrush Tan (SB)
6) Color: Fox Gray (FG)
7) Color: Lightstone (LS)
8) Color: Polar White (PW)

D. Soffit Panel:

1. Standard Panel Paint System (Siliconized Polyester Resin, 25-year Finish Warranty):

a. Color: Burnished Slate (BS)
b. Color: Evergreen (EG)
c. Color: Aztec Blue (AB)
d. Color: Brick Red (BR)
e. Color: Sagebrush Tan (SB)
f. Color: Fox Gray (FG)
g. Color: Lightstone (LS)
h. Color: Polar White (PW)

2.9 FABRICATION

A. General:

1. Shop-fabricate all framing members for field bolted assembly. The surfaces of the bolted connections must be smooth and free from burrs or distortions.
2. Shop connections must conform to the manufacturer's standard design practices as defined in this section. Certification of welder qualifications will be furnished when required and specified in advance.
3. All framing members must carry an identifying mark.

B. Primary Framing:

1. Plates, Stiffeners and Related Members.: Factory weld base plates splice plates, cap plates, and stiffeners into place on the structural members.

2. Bolt Holes and Related Machining: Shop fabricate base plates, splices and flanges to include bolt connection holes. Shop fabricated webs to include bracing holes.
3. Secondary structural connections (purlins and girts) to be ordinary bolted connections, which may include welded clips.
4. Manufacturer is responsible for all welding inspection in accordance with the manufacturer's IAS Accreditation or CAN/CSA A660 Certification. Special inspection by the buyer or owner may be done in the manufacturer's facility and must be noted on the Contract Documents.
5. Non-Destructive Testing (NDT) - NDT shall be performed and documented as required by the governing building code for this project.

C. Zee Purlins:

1. Fabricate purlins from cold-formed "Z" sections with stiffened flanges. Size flange stiffeners to comply with the requirements of the latest edition of AISI. Connection bolts will install through the webs, not the flanges.

D. Girts

1. Girts must be simple or continuous span as required by design. Connection bolts will install through the webs, not the flanges.

E. Bracing:

1. Diagonal Bracing:

   a. Wind bracing in the roof and/or walls need not be furnished where it can be shown that the diaphragm strength of the roof and/or wall covering is adequate to resist the applied wind or seismic forces. Diagonal bracing in the roof and sidewalls may be used to resist longitudinal loads (wind, crane, etc.) in the structure if diaphragm action cannot be used.
   b. Diagonal bracing will be furnished to length and equipped with hillside washers and nuts at each end. It may consist of rods threaded each end or galvanized cable with suitable threaded end anchors. If load requirements so dictate, bracing may be of structural angle and/or pipe, bolted in place.

2. Special Bracing: When diagonal bracing is not permitted in the sidewall, a rigid frame type portal or fixed base column will be used. Shear walls can also be used where adequate to resist the applied wind or seismic forces.

3. Flange Braces: The compression flange of all primary framing must be braced laterally with angles connecting to the bottoms chords of purlins or to the webs of girts so that the flange compressive stress is within allowable limits for any combination of loading.

4. Bridging:

a. Laterally bridge the top and bottom chords of the open-web bar joists as required by design thereof and specified on the building erection drawings.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Before erection proceeds, survey elevations and locations of concrete and masonry bearing surfaces and locations of anchor rods, bearing plates and other embedment's to receive structural framing, with Erector present, for compliance with requirements and metal building system manufacturer's tolerances.

C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads equal in intensity to design loads. Remove temporary supports when permanent structural framing connections and bracing are in place, unless otherwise indicated.

3.3 INSTALLATION

A. The erection of the building system shall be performed by a qualified erector, in accordance with the appropriate erection drawings, erection guides and /or other documents furnished by manufacturer, using proper tools, equipment and safety practices.

B. Erection practices shall conform to "Common Industry Practices", Section 6, MBMA (LR)-Building Systems Manual.

C. There shall be no field modifications to primary structural members except as authorized and specified by manufacturer.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

INDEX TO

SECTION 14 24 00

HYDRAULIC PASSENGER ELEVATORS

SECTION 14 24 00

HYDRAULIC PASSENGER ELEVATORS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes: Hydraulic passenger elevators as shown and specified. Elevator work includes:

1. Standard pre–engineered hydraulic passenger elevators.
2. Elevator car enclosures, hoist way entrances and signal equipment.
3. Operation and control systems.
4. Jack(s).
5. Accessibility provisions for physically disabled persons.
6. Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.
7. Materials and accessories as required to complete the elevator installation.

B. Related Sections:

1. Division 1 General Requirements: Meet or exceed all referenced sustainability requirements.
2. Division 3 Concrete: Installing inserts, sleeves and anchors in concrete.
3. Division 4 Masonry: Installing inserts, sleeves and anchors in masonry.
4. Division 5 Metals:
   a. Providing hoist beams, pit ladders, steel framing, auxiliary support steel and divider beams for supporting guide–rail brackets.
   b. Providing steel angle sill supports and grouting hoistway entrance sills and frames.
5. Division 9 Finishes: Providing elevator car finish flooring and field painting unfinished and shop primed ferrous materials.
6. Division 16 Sections:
   a. Providing electrical service to elevators, including fused disconnect switches.
   b. Emergency power supply, transfer switch and auxiliary contacts.
   c. Heat and smoke sensing devices.
   d. Convenience outlets and illumination in control room, hoist way and pit.
7. Division 22 Plumbing
   a. Sump pit and oil interceptor.

8. Division 23 Heating, Ventilation and Air Conditioning

   a. Heating and ventilating hoist ways and/or control room.

C. Work Not Included: General contractor shall provide the following in accordance with the requirements of the Model Building Code and ANSI A17.1 Code. For specific rules, refer to ANSI A17.1, Part 3 for hydraulic elevators. State or local requirements must be used if more stringent. The cost of this work is not included in the ThyssenKrupp Elevator's proposal, since it is a part of the building construction.

1. Elevator hoist beam to be provided at top of elevator shaft. Beam must be able to accommodate proper loads and clearances for elevator installation and operation.
2. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports and bracing including all setting templates and diagrams for placement.
3. Hatch walls require a minimum two hours of fire rating. Hoist way should be clear and plumb with variations not to exceed 1/2" at any point.
4. Elevator hoist ways shall have barricades, as required.
5. Install bevel guards at 75° on all recesses, projections or setbacks over 2" (4" for A17.1 2000 areas) except for loading or unloading.
6. Provide rail bracket supports at pit, each floor and roof. For guide rail bracket supports, provide divider beams between hoist way at each floor and roof.
7. Pit floor shall be level and free of debris. Reinforce dry pit to sustain normal vertical forces from rails and buffers.
8. Where pit access is by means of the lowest hoist way entrance, a vertical ladder of non-combustible material extending 42" minimum, (48" minimum for A17.1–2000 areas) shall be provided at the same height, above sill of access door or handgrips.
9. Machine room to be enclosed and protected.
10. Machine Room temperature must be maintained between 55° and 90° F.
11. If machine room is remote from the elevator hoist way, clear access must be available above the ceiling or metal/concrete raceways in floor for oil line and wiring duct from machine room.
12. Access to the machinery space and machine room must be in accordance with the governing authority or code.
13. Provide an 8" x 16" cutout through machine room wall, for oil line and wiring duct, coordinated with elevator contractor at the building site.
14. All wire and conduit should run remote from the hoist ways.
15. When heat, smoke or combustion sensing devices are required, connect to elevator control cabinet terminals. Contacts on the sensors should be sided for 12-volt D.C.
16. Install and furnish finished flooring in elevator cab.

17. Finished floors and entrance walls are not to be constructed until after sills and door frames are in place. Consult elevator contractor for rough opening size. The general contractor shall supply the drywall framing so that the wall fire resistance rating is maintained, when drywall construction is used.

18. Where sheet rock or drywall construction is used for front walls, it shall be of sufficient strength to maintain the doors in true lateral alignment. Drywall contractor to coordinate with elevator contractor.

19. Before erection of rough walls and doors; erect hoist way sills, headers, and frames. After rough walls are finished; erect fascia's and toe guards. Set sill level and slightly above finished floor at landings.

20. To maintain legal fire rating (masonry construction), door frames are to be anchored to walls and properly grouted in place.

21. The elevator wall shall interface with the hoist way entrance assembly and be in strict compliance with the elevator contractor's requirements.

22. General Contractor shall fill and grout around entrances, as required.

23. Elevator sill supports shall be provided at each opening.

24. All walls and sill support must be plumb where openings occur.

25. For applications with jack hole, free and clear access to the elevator pit area for the jack hole–drilling rig is required.

26. Where jack hole is required, remove all spoils from jack hole drilling.

27. When not provided by Elevator Contractor, jack hole shall accommodate the jack unit. If required, the jack hole is to be provided in strict accordance with the elevator contractor's shop drawings.

28. Locate a light fixture (200 lx / 19 fc) and convenience outlet in pit with switch located adjacent to the access door.

29. A light switch and fused disconnect switch for each elevator should be located inside the machine room adjacent to the door, where practical, per the National Electrical Code (NFPA No. 70).

30. For signal systems and power operated door: provide ground and branch wiring circuits, including main line switch.

31. For car light and fan: provide a feeder and branch wiring circuits, including main line switch.

32. Wall thickness may increase when fixtures are mounted in drywall. These requirements must be coordinated between the general contractor and the elevator contractor.

33. Provide supports, patching and recesses to accommodate hall button boxes, signal fixtures, etc.

34. Locate telephone and convenience outlet on control panel.

1.2 SUBMITTALS

A. Product data: When requested, the elevator contractor shall provide standard cab, entrance and signal fixture data to describe product for approval.

B. Shop drawings:

1. Show equipment arrangement in the corridor, pit, and hoist way and/or optional control room. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.

2. Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.

3. Show floors served, travel distances, maximum loads imposed on the building structure at points of support and all similar considerations of the elevator work.

4. Indicate electrical power requirements and branch circuit protection device recommendations.

C. Powder Coat paint selection: Submit manufacturer's standard selection charts for exposed finishes and materials.

D. Plastic laminate selection: Submit manufacturer's standard selection charts for exposed finishes and materials.

E. Metal Finishes: Upon request, standard metal samples provided.

F. Operation and maintenance data. Include the following:

1. Owner's manuals and wiring diagrams.

Parts list, with recommended parts inventory.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: An approved manufacturer with minimum 15 years of experience in manufacturing, installing, and servicing elevators of the type required for the project.

1. The manufacturer of machines, controllers, signal fixtures, door operators' cabs, entrances, and all other major parts of elevator operating equipment.

a. The major parts of the elevator equipment shall be manufactured by the installing company, and not be an assembled system.

2. The manufacturer shall have a documented, on–going quality assurance program.

3. ISO–9001:2000 Manufacturer Certified

4. ISO–14001:2004 Environmental Management System Certified

5. LEED Gold certified elevator manufacturing facility.

B. Installer Qualifications: The manufacturer or an authorized agent of the manufacturer with not less than 15 years of satisfactory experience installing elevators equal in character and performance to the project elevators.

C. Regulatory Requirements:

1. ASME A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code.

2. Building Code: National.
3. NFPA 70 National Electrical Code.
4. NFPA 80 Fire Doors and Windows.
5. Americans with Disabilities Act – Accessibility Guidelines (ADAAG)
6. Section 407 in ICC.A117.1, when required by local authorities
7. CAN/CSA C22.1 Canadian Electrical Code
8. CAN/CSA B44 Safety Code for Elevators and Escalators.
9. California Department of Public Health Standard Method V1.1–2010, CA Section 01350

D. Fire–rated entrance assemblies: Opening protective assemblies including frames, hardware, and operation shall comply with ASTM E2074, CAN4–S104 (ULC–S104), UL10(b), and NFPA Standard 80. Provide entrance assembly units bearing Class B or 1 1/2 hour label by a Nationally Recognized Testing Laboratory (2 hour label in Canada).

E. Inspection and testing:

1. Elevator Installer shall obtain and pay for all required inspections, tests, permits and fees for elevator installation.
2. Arrange for inspections and make required tests.
3. Deliver to the Owner upon completion and acceptance of elevator work.

F. Sustainable Product Qualifications:

1. Environmental Product Declaration:
   a. GOOD: If Product Category Rules (PCR) are not available, produce a publicly available, critically reviewed life–cycle assessment conforming to ISO 14044 that has at least a cradle to gate scope.
   b. BEST: If Product Category Rules (PCR) are available, produce and publish an Environmental Product Declaration (EPD) based on a critically reviewed life–cycle assessment conforming to ISO 14044, with external verification recognized by the EPD program operator.
2. Material Transparency:
   a. GOOD: Provide Health Product Declaration at any level
   b. BETTER: Provide Health Product Declaration (HPD v2 or later). Complete, published declaration with full disclosure of known hazards, prepared using the Health Product Declaration Collaborative's "HPD builder" on–line tool.
   c. BEST: Cradle to Cradle Material Health Certificate v3, Bronze level or higher.
3. LEED v4 – Provide documentation for all Building Product Disclosure AND Optimization credits in LEED v4 for product specified.
4. Living Building Challenge Projects: Provide Declare label for products specified.

1.4 DELIVERY, STORAGE AND HANDLING

A. Manufacturing shall deliver elevator materials, components and equipment and the contractor is responsible to provide secure and safe storage on job site.

1.5 PROJECT CONDITIONS

A. Temporary Use: Elevators shall not be used for temporary service or for any other purpose during the construction period before Substantial Completion and acceptance by the purchaser unless agreed upon by Elevator Contractor and General Contractor with signed temporary agreement.

B. Provide the hole for the jack unit (if required by the type of jack provided), based on excavation through normal soil or clay which can be removed by manual digging or by standard truck–mounted regular drilling unit. Provide a casing if required to retain the walls of the hole. General contractor shall remove excavation spoils deposited in the elevator pit.

1. If a physical obstruction or hindrance is encountered below the ground surface, including boulders, rock, gravel, wood, metal, pilings, sand, water, quick sand, caves, public utilities or any other foreign material, obtain written authorization to proceed with excavating using special excavation equipment.
2. Maintain a daily log of time and material costs involved.
3. Elevator contractor will be compensated on a time and material basis for additional costs incurred after encountering the physical obstruction or hindrance, including the cost of the special excavation equipment.

1.6 WARRANTY

A. Warranty: Submit elevator manufacturer's standard written warranty agreeing to repair, restore or replace defects in elevator work materials and workmanship not due to ordinary wear and tear or improper use or care for 12 months after final acceptance.

1.7 MAINTENANCE

A. Furnish maintenance and call back service for a period of 3 months for each elevator after completion of installation or acceptance thereof by beneficial use, whichever is earlier, during normal working hours excluding callbacks.

1. Service shall consist of periodic examination of the equipment, adjustment, lubrication, cleaning, supplies and parts to keep the elevators in proper operation. Maintenance work, including emergency call back repair service, shall be performed by trained employees of the elevator contractor during regular working hours.
2. Submit parts catalog and show evidence of local parts inventory with complete list of recommended spare parts. Parts shall be produced by manufacturer of original equipment.

3. Manufacturer shall have some service office and full–time service personnel within a 100 mile radius of the project site.

4.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Design based around ThyssenKrupp Elevator's 2500 Endura MRL hydraulic elevator.

2.2 MATERIALS, GENERAL

A. All Elevator Cab materials including frame, buttons, lighting, wall and ceiling assembly, laminates and carpet shall have an EPD and an HPD and shall meet the California Department of Public Health Standard Method V1.1–2010, CA Section 01350 as mentioned in 1.03.9 of this specification.

B. Colors, patterns, and finishes: As selected by the Architect from manufacturer's full range of standard colors, patterns, and finishes.

C. Steel:

1. Shapes and bars: Carbon.
2. Sheet: Cold–rolled steel sheet, commercial quality, Class 1, matte finish.
3. Finish: Factory–applied baked enamel for structural parts, powder coat for architectural parts. Color selection must be based on elevator manufacture's standard selections.

D. Plastic laminate: Decorative high–pressure type, complying with NEMA LD3, Type GP–50 General Purpose Grade, nominal 0.050" thickness. Laminate selection must be based on elevator manufacture's standard selections.

E. Flooring by others.

2.3 HOISTWAY EQUIPMENT

A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood sub–floor. Underside of the platform shall be fireproofed. The car platform shall be designed and fabricated to support one–piece loads weighing up to 25% of the rated capacity.

B. Sling: Steel stiles bolted or welded to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.

C. Guide Rails: Steel, omega shaped, fastened to the building structure with steel brackets.

D. Guides: Slide guides shall be mounted on top and bottom of the car.

E. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on continuous channels fastened to the elevator guide rail or securely anchored to the pit floor. Provide extensions if required by project conditions.

F. Jack: A jack unit shall be of sufficient size to lift the gross load the height specified. Factory test jack to insure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Provide the following jack type: Twin post holeless telescopic 2–stage. Two jacks piped together, mounted one on each side of the car with each having two telescopic sections designed to extend in a synchronized manner when oil is pumped into the assembly. Each jack section will be guided from within the casing or the plunger assembly used to house the section. Each plunger shall have a high pressure sealing system which will not allow for seal movement or displacement during the course of operation. Each jack assembly shall have a check valve built into the assembly to allow for automatically re–syncing the two plunger sections by moving the jack to its fully contracted position. The jack shall be designed to be mounted on the pit floor or in a recess in the pit floor. Each jack section shall have a bleeder valve to discharge any air trapped in the section.

G. Automatic Self–Leveling: Provide each elevator car with a self–leveling feature to automatically bring the car to the floor landings and correct for over travel or under travel. Self–leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.

H. Wiring, Piping, and Oil: Provide all necessary hoist way wiring in accordance with the National Electrical Code. All necessary code compliant pipe and fittings shall be provided to connect the power unit to the jack unit. heliotype

I. Pit moisture/water sensor located approximately 1 foot above the pit floor to be provided. Once activated, elevator will perform "flooded pit operation", which will run the car up to the designated floor, cycle the doors and shut down and trip the circuit breaker shunt to remove 3 phase power from all equipment, including pit equipment.

J. Motorized oil line shut–off valve shall be provided that can be remotely operated from the controller landing service panel. Also, a means for manual operation at the valve in the pit is required.

2.4 POWER UNIT

A. Power Unit (Oil Pumping and Control Mechanism): A self–contained unit consisting of the following items:

1. An oil reservoir with tank cover.

2. An oil hydraulic pump.

3. An electric motor.

4. An oil control valve with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and electro–magnetic controlling solenoids.

B. Pump: Positive displacement type pump specifically manufactured for oil–hydraulic elevator service. Pump shall be designed for steady discharge with minimum pulsation to give smooth and quiet operation. Output of pump shall not vary more than 10 percent between no load and full load on the elevator car.

C. Motor: Standard manufacture motor specifically designed for oil–hydraulic elevator service. Duty rating shall be selected for specified speed and load.

D. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.

1. Relief valve shall be adjustable and be capable of bypassing the total oil flow without increasing back pressure more than 10 percent above that required to barely open the valve.

2. Up start and stop valve shall be adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, ensuring smooth up starts and up stops.

3. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.

4. Lowering valve and leveling valve shall be adjustable for down start speed, lowering speed, leveling speed and stopping speed to ensure smooth "down" starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling after slowdown is initiated.

5. Provided with constant speed regulation in both up and down direction. Feature to compensate for load changes, oil temperature, and viscosity changes.

6. Solid State Starting: Provide an electronic starter featuring adjustable starting currents.

7. Oil Type: Provide a zinc free, inherently biodegradable lubricant formulated with premium base stocks to provide outstanding protection for demanding hydraulic systems, especially those operating in environmentally sensitive areas.

2.5 HOISTWAY ENTRANCES

A. Doors and Frames: Provide complete hollow metal type hoist way entrances at each hoist way opening bolted\knock down construction.

1. Manufacturer's standard entrance design consisting of hangers, doors, hanger supports, hanger covers, fascia plates (where required), sight guards, and necessary hardware.

2. Main landing door & frame finish: Stainless steel panels, no. 4 brushed finish.

3. Typical door & frame finish: Stainless steel panels, No. 4 brushed finish.

B. Interlocks: Equip each hoist way entrance with an approved type interlock tested as required by code. Provide door restriction devices as required by code.

C. Door Hanger and Tracks: Provide sheave type two–point suspension hangers and tracks for each hoist way horizontal sliding door.

1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.

2. Hangers: Provide an adjustable device beneath the track to limit the up–thrust of the doors during operation.

3. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.

D. Hoist way Sills: Extruded metal, with groove(s) in top surface. Provide mill finish on aluminum.

2.6 PASSENGER ELEVATOR CAR ENCLOSURE

A. Car Enclosure:

1. Walls: Cab type a steel shell design, reinforced cold–rolled steel with an applied panel design. The applied panels design, shall be arranged vertically on wood core panels covered on both sides with stainless steel: ASTM A 167, No. 4 brushed finish.

2. Reveals and frieze: Stainless steel, No. 4 brushed finish

3. Canopy: Cold–rolled steel with hinged exit.

4. Ceiling: Suspended type, LED lighting with translucent diffuser mounted in a metal frame. Framework shall be finished with a factory applied powder coat finish.

5. Cab Fronts, Return, Transom, Soffit and Strike: Provide panels faced with No. 4 brushed stainless steel

6. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non–metallic sliding

guides.

a. Door Finish: Stainless steel panels: No. 4 brushed finish.

b. Cab Sills: Extruded aluminum, mill finish.

7. Handrail: Provide 2" flat metal bar on side and rear walls on front opening cars and side walls only on front and rear opening cars. Handrails shall have a stainless steel, No. 4 brushed finish.

8. Ventilation: Manufacturer's standard exhaust fan, mounted on the car top.

9. Protection pads and buttons: Provide one set of vinyl protection pads with metal grommets for the project. Provide pad buttons on cab front(s) and walls.

B. Car Top Inspection: Provide a car top inspection station with an "Auto–Inspection" switch, an "emergency stop" switch, and constant pressure "up and down" direction and safety buttons to make the normal operating devices inoperative. The station shall give the inspector complete control of the elevator. The car top inspection station shall be mounted in the door operator assembly.

2.7 DOOR OPERATION

A. Door Operation: Provide a direct or alternating current motor driven heavy duty operator designed to operate the car and hoist way doors simultaneously. The door control system shall be digital closed loop and the closed loop circuit shall give constant feedback on the position and velocity of the elevator door. The motor torque shall be constantly adjusted to maintain the correct door speed based on its position and load. All adjustments and setup shall be through the computer–based service tool. Door movements shall follow a field programmable speed pattern with smooth acceleration and deceleration at the ends of travel. The mechanical door operating mechanism shall be arranged for manual operation in event of power failure. Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing. AC controlled units with oil checks, or other deviations are not acceptable.

1. No Un–Necessary Door Operation: The car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as a dispatch car.

2. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.

3. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is not registered before the door closes to within 6 inches of fully closed, the travel shall reverse, and the door shall reopen to answer the other call.

4. Nudging Operation: The doors shall remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door closing is prevented for a field programmable time, a

buzzer shall sound. When the obstruction is removed, the door shall begin to close at reduced speed. If the infra–red door protection system detects a person or object while closing on nudging, the doors shall stop and resume closing only after the obstruction has been removed.

5. Door Reversal: If the doors are closing and the infra–red beam(s) is interrupted, the doors shall reverse and reopen. After the obstruction is cleared, the doors shall begin to close.

6. Door Open Watchdog: If the doors are opening, but do not fully open after a field adjustable time, the doors shall recycle closed then attempt to open six times to try and correct the fault.

7. Door Close Watchdog: If the doors are closing, but do not fully close after a field adjustable time, the doors shall recycle open then attempt to close six times to try and correct the fault.

8. Door Close Assist: When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied to possibly overcome mechanical resistance or differential air pressure and allow the door to close.

B. Door Protection Device: Provide a door protection system using microprocessor controlled infra–red light beams. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen.

2.8 CAR OPERATING STATION

A. Car Operating Station, General: The main car control in each car shall contain the devices required for specific operation mounted in an integral swing return panel requiring no applied faceplate. Wrap return shall have a No. 4 brushed stainless–steel finish. The main car operating panel shall be mounted in the return and comply with handicap requirements. Pushbuttons that illuminate using long lasting LED's shall be included for each floor served, and emergency buttons and switches shall be provided per code. Switches for car light and accessories shall be provided.

B. Emergency Communications System: Integral phone system provided.

C. Auxiliary Operating Panel: Not Required

D. Column Mounted Car Riding Lantern: A car riding lantern shall be installed in the elevator cab and located in the entrance. The lantern, when illuminated, will indicate the intended direction of travel. The lantern will illuminate, and a signal will sound when the car arrives at a floor where it will stop. The lantern shall remain illuminated until the door(s) begin to close.

E. Special Equipment: Not Applicable

2.9 CONTROL SYSTEMS

A. Controller: The elevator control system shall be microprocessor based and software oriented. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops, and by "up–down" push buttons at each intermediate landing and "call" push buttons at terminal landings.

B. Automatic Light and Fan shut down: The control system shall evaluate the system activity and automatically turn off the cab lighting and ventilation fan during periods of inactivity. The settings shall be field programmable.

C. Emergency Power Operation: (10-DOA) Upon loss of the normal power supply, building-supplied standby power is available on the same wires as the normal power supply. Once the loss of normal power is detected and standby power is available, the elevator is lowered to a pre-designated landing and the doors are opened. After passengers have exited the elevator, the doors are closed, and the car is shut down. When normal power is restored, the elevator automatically resumes operation.

D. Special Operation: Not Applicable

2.10 HALL STATIONS

A. Hall Stations, General: Vandal resistant buttons with center jewels which illuminate to indicate that a call has been registered at that floor for the indicated direction. Each button shall be provided with an internal automatic stop to prevent damage of switches that register the call. Provide 1 set of pushbutton risers. All fixtures shall be vandal resistant type.

1. Provide one pushbutton riser with faceplates having a No. 4 brushed stainless-steel finish.

a. Phase 1 firefighter's service key switch, with instructions, shall be incorporated into the hall station at the designated level.

B. Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.

C. Hall Position Indicator: An electronic dot matrix position indicator shall be provided and mounted for optimum viewing. As the car travels, its position in the hoist way shall be indicated by the illumination of the alphanumeric character corresponding to the landing which the elevator is stopped or passing. When hall lanterns are provided, the position indicator shall be combined with the hall lanterns in the same faceplate. Faceplates shall match hall stations. Provide at all typical landings.

D. Hall lanterns: Not Applicable

E. Special Equipment: Not Applicable

2.11 MISCELLANEOUS ELEVATOR COMPONENTS

A. Oil Hydraulic Silencer: Install multiple oil hydraulic silencers (muffler device) at the power unit location. The silencers shall contain pulsation absorbing material inserted in a blowout proof housing.

PART 3 EXECUTION

3.1 EXAMINATION

A. Before starting elevator installation, inspect hoist way, hoist way openings, pits and/or control room, as constructed, verify all critical dimensions, and examine supporting structures and all other conditions under which elevator work is to be installed. Do not proceed with elevator installation until unsatisfactory conditions

have been corrected in a manner acceptable to the installer.

B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.2 INSTALLATION

A. Install elevator systems components and coordinate installation of hoist way wall construction.

1. Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1, manufacturer's installation instructions and approved shop drawings.

2. Comply with the National Electrical Code for electrical work required during installation.

B. Jack unit excavation (if required by the type of jack provided): Drill or otherwise excavate below elevator pit construction as required to install the jack unit.

1. Install casing for jack unit.

2. Provide HDPE jack protection system for all in ground jacks.

3. Set casing for jack unit assembly plumb, and partially fill with water settled sand, eliminating voids. Back fill depth shall be sufficient to hold the bottom of the jack in place over time.

C. Perform work with competent, skilled workmen under the direct control and supervision of the elevator manufacturer's experienced foreman.

D. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports, and bracing including all setting templates and diagrams for placement.

E. Welded construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualification of welding operators.

F. Coordination: Coordinate elevator work with the work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to ensure dimensional coordination of the work.

G. Install machinery, guides, controls, car and all equipment and accessories to provide a quiet, smoothly operating installation, free from side sway, oscillation or vibration.

H. Alignment: Coordinate installation of hoist way entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum safe, workable dimensions at each landing.

I. Erect hoist way sills, headers, and frames before erection of rough walls and doors; erect fascia and toe guards after rough walls finished. Set sill units accurately aligned and slightly above finish floor at landings.

J. Lubricate operating parts of system, where recommended by manufacturer.

3.3 FIELD QUALITY CONTROL

A. Acceptance testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required and recommended by Code and governing regulations or agencies. Perform other tests, if any, as required by governing regulations or agencies.

B. Advise Owner, Contractor, Architect, and governing authorities in advance of dates and times tests are to be performed on the elevator.

3.4 ADJUSTING

A. Make necessary adjustments of operating devices and equipment to ensure elevator operates smoothly and accurately.

3.5 CLEANING

A. Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided. Stainless steel shall be cleaned with soap and water and dried with a non–abrasive surface; it shall not be cleaned with bleach–based cleansers.

B. At completion of elevator work, remove tools, equipment, and surplus materials from site. Clean equipment rooms and hoist way. Remove trash and debris.

1. Use environmentally preferable and low VOC emitting cleaners for each application type. Cleaners that contain solvents, pine and/or citrus oils are not permitted.

3.6 PROTECTION

A. At time of Substantial Completion of elevator work, or portion thereof, provide suitable protective coverings, barriers, devices, signs, or other such methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

3.7 DEMONSTRATION

A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.

B. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

3.8 ELEVATOR SCHEDULE

A. Elevator Qty. 1

1. Elevator Model: **2500 Endura MRL** Above–Ground (2–Stage)
2. Elevator Type: Hydraulic Passenger
3. Rated Capacity: 2500 lbs.

4. Rated Speed: 150 ft./min.
5. Operation System: TAC32H
6. Travel: 22'–6"
7. Landings: 2 total
8. Openings:
a. Front: 1
b. Rear: 0
9. Clear Car Inside: 6' – 8" wide x 4' – 3" deep
10. Cab Height: 8'–0" standard
11. Hoist way Entrance Size: 3' – 6" wide x 7'–0" high
12. Door Type: Single Speed- front left
13. Power Characteristics: 460 volts, 3 Phase, 60 Hz.
14. Seismic Requirements: Zone 1
15. Hoist way Dimensions: 8' – 4" wide x 5' – 9" deep
16. Pit Depth: 4' – 0"
17. Button & Fixture Style: Vandal Resistant Signal Fixtures
18. Special Operations: None

3.9 SPECIAL CONDITIONS- None

END OF SECTION

INDEX TO

SECTION 22 10 00 – VERTICAL TURBIN PUMP (EFFLUENT PUMP STATION)

SECTION 22 10 00

VERTICAL TURBIN PUMPS (EFFLUENT PUMP INSTALLATION)

PART 1 – GENERAL

1.1 DESCRIPTION

A. The work under this section covers placement of a vertical turbine pump, valves, Controls, fittings and associated components.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Division 26 Electrical

1.3 REFERENCES

A. AWWA Specification A100 (latest revision) should be used as a guide.

1.4 QUALIFICATIONS

A. Manufacturer – Material and equipment shall be the standard products of a manufacturer who has made them for a minimum of five years and who provides published data and performance curves.

B. Subcontractor – A subcontractor for any part of the work must have experience on similar work and if required shall furnish the Engineer with a list of projects and the names of Owners and Engineers who are familiar with their capabilities.

C. Testing Agencies – The individual or laboratory making the chemical analysis must be an established laboratory or groundwater geologist that is registered and experienced in this type of testing. Testing methods shall be performed in accordance with the latest approved EPA methods and quality control requirements. Laboratories shall be a State Certified Laboratory. A list of agencies and/or individuals to be used shall be submitted to the Engineer for review prior to engagement.

1.5 REQUIREMENTS OF REGULATORY AGENCIES

A. Upon completion of the pump station, pumphead, and associated piping, the Contractor shall also submit pressure tests and results to the Engineer.

1.6 SOURCE QUALITY CONTROL

A. Mill Tests – A mill certificate stating the quality of metal and strength shall be furnished for the pump casing, pump bowls, and impellers.

B. Pump Performance – Certified curves showing the capacity of the pumps at various heads, the efficiency, and the required horsepower, shall be furnished by the pump manufacturer. Lead Free Material – All pipe material, solder, and flux

shall be lead free (less than 2 percent lead in solder and flux and less than 8.0 percent in pipes and fittings).

1.7 SUBMITTALS

A. In addition to the requirement of Section 01300, the Contractor shall also submit the following data for approval before material and equipment is ordered.

1. Manufacturer's Data – Bulletins of pump motor.

2. Maintenance Data and Operating Instructions – A bulletin for each piece of equipment showing the lubrication and adjustment programs recommended by the manufacturer.

3. Construction Schedule – A schedule shall be submitted detailing the depths and size of all drilling operations.

1.8 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Equipment to be installed in the work shall be delivered to the site and stored in a protective container so that no damage occurs from weather, dirt, or vandals.

1.9 POWER

A. The Contractor shall provide power for construction.

1.10 SCHEDULE

A. Contractor shall coordinate the piping to facilitate future installation of the 4th pump. Contractor shall submit a schedule showing the start and time required for each increment of the work and shall order the material and equipment for delivery to match this schedule.

1.11 JOB CONDITIONS

A. The Contractor shall perform his work in a manner that will cause minimum disturbance to the appearance of the area. Materials shall be stored neatly without damaging trees and shrubbery.

1.12 GUARANTEE

A. The Contractor shall guarantee the quality of the materials, equipment, and workmanship for a period of 12 months after acceptance of the completed project. Defects discovered during that period shall be replaced by the Contractor at no cost to the Owner. The Performance Bond shall reflect this guarantee.

1.13 MEASUREMENT AND PAYMENT

A. Payment for the piping, pump, and motor will be made at the contract lump sum for the effluent pump station". Payment will include the pump, motor, flow meter,

and accessories, well vent, controls, testing, and all piping incidental to operation and connection to the proposed effluent force main.

PART 2 – PRODUCTS

The materials used shall be the following.

2.1 PUMP

A. Shall furnish and install, at the locations on the drawings, all pumps and accessories as herein specified and required for a complete installation. Pumps in this section shall be described in the following specifications:

All anchor bolts shall be stainless steel and shall be furnished by the contractor complete with or as required by the manufacturer of nuts and setting templates. All structural steel shall conform to ASTM "Standard Specifications for Grey Iron Castings." All parts of the mechanism shall be proportioned for all stresses which may occur during fabrication, erection, testing, and operation. Duplicate parts shall be interchangeable.

The pump manufacturers shall furnish the services of factory trained representatives, for two (2) working days each, to supervise the installation and testing of the pumps and to instruct operating personnel in their proper operation and maintenance. The pump manufacturer shall furnish one (1) complete set of packing for each pump as spare parts.

All moving exposed parts shall be provided with guards in accordance with the requirements of the State Division of Safety Standards. Guards shall be fabricated of 14–gauge steel, 1/2–13–15 expanded metal screen to provide visual inspection of moving parts without removal of the guard. Guards shall be galvanized after fabrication and shall be designed to be readily removable to facilitate maintenance of the moving parts.

Equipment nameplates shall be required for the pump and motor and shall be engraved or stamped on stainless steel and fastened to the equipment. Nameplate information shall include the manufacturer's name, serial number, model number, capability, horsepower, and other information required to adequately identify the performance and capability of the equipment.

B. Vertical Turbine Pumps – The pumps to be installed at the effluent structure shall be a motor driven, vertical turbine pump suitable for continuous operation at a minimum of **4000 gpm @ 98** ft. of TDH with an 885 RPM, 460v, 3 phase, 60 Hz,**150 Hp inverter duty rated, WP1 style motor.** The pump shall be manufactured by Peerless, pump model 24HXC, 3 stages. The total pumping head does not include losses in the pump which must be included when selecting the pump.

1. Discharge Column – The discharge column shall be 14" Ø in standard 10-foot lengths, carbon steel, ASTM A–53, Grade B with flanged connection and shall contain a supporting spider for the line shaft at each joint 10 feet apart. The screw coupling shall be a Class 80 Cast Iron combination

coupling and shall be integrally cast in one piece or sleeve type with drop–in or screw in bronze bearing retainer. The line shaft shall be made from stainless steel, A276–410. It shall be run in water lubricated cutlass rubber D2000, 1BF715 bearings with stainless steel sleeves spaced not over 10 feet apart. The pump motor shall be equipped with block heater. The line shaft shall be water lubricated and sufficient column shall be furnished to give the required pump bowl submergence at the operating capacity.

2. Impeller Shaft – A276–410 Stainless Steel.

3. Bowl – Class 30 cast iron A48–30.

4. Impeller – Bronze, B584–836.

5. Wear Rings & Bushings – Bronze B505–836.

6. Suction Strainer – AISI Type 304 Stainless Steel.

C. Discharge Head – A suitable pump head of high grade cast iron ASTM A48, Class 30, shall be provided for mounting the motor and supporting the pump column, bowl, and suction pipe. The above ground outlet shall be flanged and drilled to match ANSI class 125 cast iron or 150 steel flange connections. Also, the discharge flange shall have a 1/4" NPT connection for a pressure gage. The design shall permit the drive shaft to be coupled above the stuffing box to facilitate easy removal and replacement of the driver. The cast iron stuffing box shall be of the deep bore type with a minimum of six rings of packing and a seal cage. The packing gland shall be the bronze split type and secured in place with ASTM, A193, Grade B8 stainless steel studs and silicon bronze nuts. The stuffing box bearing shall be ASTM B505, Alloy 836 bronze. The pump head shall be equipped with a sole plate as recommended for this application by the pump manufacturer.

D. Motor – The electric motor shall conform to construction and performance with the National Electric Manufacturer's Association Standards for motors as last revised. It shall be of the squirrel cage NEMA design B, normal torque, low starting current type in vertical, weather protected frames. The motor shall have a full load nominal speed listed on the drawings or less and a brake horsepower equal to or greater than that required by the selected pump at the rated head, and not be smaller than horsepower listed on the drawings. Motor shall be inverter duty rated. Details of motor service and construction are specified in Section 26 "Electrical."

E. Column Assembly – Column Pipe shall be furnished in interchangeable sections not over 10 feet in length and shall be connected with flanged connections. The friction loss in the column shall not exceed 5 feet per 100 feet of column, based on the rated capacity of the pump. The weight and size of the column shall be no less than required in AWWA spec E101–1. The line shafting shall be AISI stainless steel of ample size, minimum of 2.19" in diameter, to operate the pump without distortion or vibration. The shaft shall be furnished in interchangeable sections not more than 10 feet in length and shall be coupled with AISI 410 stainless steel coupling. The column assembly shall have bronze retainers retained by the

butted pipe ends. Each bearing retainer shall contain a water–lubricated, cut less rubber bearing designed for vertical turbine pump service.

F. Pump Bowl Assembly – The pump bowl shall be of close-grained cast icon, having a minimum tensile strength of 30,000 pounds per square inch, free from blow holes, sand holes, and all other faults; accurately machined and fitted to close dimensions. Bowls are to be coated inside with a smooth vitreous enamel to reduce friction losses, corrosion and sand wear in the water passages and this gives better efficiency. Each intermediate bowl is to be constructed by using a bronze bearing and a neoprene bearing to support the impeller shaft which gives the longest possible life, based on the widest range of pump conditions. Pump shall have sufficient stages.

The bowl is to provide a side seal at the impeller skirt and in addition a resilient neoprene ring, reinforced with an imbedded steel core, is to be installed in the bowl directly below the impeller skirt. This "lateral bowl ring" is to reduce the wear of the impeller skirt. Original capacities and efficiencies are to be maintained by adjustment of the top shaft nut at the top of the motor. The impellers shall be of bronze enclosed type only accurately machined and finished, and balanced. They shall be securely fastened to the impeller shaft with a steel taper bushing. The impeller shaft shall be of stainless steel of not less than 12% chrome, The impeller shaft shall be supported by a combination of water lubricated, fluted rubber and bronze bearings. Discharge and suction cases shall both be fitted with steel sand collars. All bowl boltings shall be of stainless steel.

Strainer – The bell suction shall be fitted with a cone type galvanized steel basket strainer. The openings in the strainer shall be of proper size to exclude anything large enough to clog the impeller. The open area of the strainer shall not be less than four times the impeller eye area.

2.2 AIR RELEASE VALVE

An air release valve and vacuum release valve shall be installed as shown on the drawings and as specified below.

A. Air Release Valve – Valve shall operate by allowing air to exit the valve at an adjustable and controlled rate until the liquid enters the chamber to raise the float at which time the valve will close. The valve shall be manufactured by Crispin, APCO, or Valmatic deep well air valve. It shall have NPT screwed inlet and outlet connection with cast iron body and top, bronze and brass trip and stainless-steel ball float.

2.3 CONTROLS

A. Controls for the effluent pump station shall be provided via SCADA system supplier. The pump system control logic shall allow for the SCADA PLC to control automatic alternation of the pumps and level in the wet well shall be sensed by a Submersible Transducer or ultrasonic transducer as well as floats. The levels shall consist of, Off, Lead, Lag, and High Level. Float and transducer cable of adequate length shall be provided to reach the pump control panel without splicing.

2.4 PRESSURE GAUGE

A. Shall be USG General Pressure gauge with single phosphor bronze Bourdon Tube, brass movement, drawn steel case and drawn steel friction fit beaded ring in baked enamel finish. Heavy flat glass crystal. 3–1/3–inch diameter dial with white background and black lines and figures. Maximum range 100 psi figure intervals 20 psi intermediate intervals 2 psi, 5/8-inch square brass bar socket.

B. Gauge shall be furnished and installed complete with 1/2" stainless steel nipples, impulse dampener, needle valve and other components required for a successful operation.

2.5 PUMP PRESSURE SUSTAINING VALVE

Pressure Sustaining Valve – a 14" Pressure Sustaining Valve shall be installed on the discharge side of each vertical turbine pump. Valves shall be **CLA-Val Model 60-32/660-32** combination pump control and back pressure valve. Valves shall be flanged, ductile iron body with diaphragm seat and stainless-steel trim. A pressure gauge shall be installed upstream and downstream of the valve.

PART 3 – EXECUTION

The equipment shall be installed and placed into operation by the Contractor. This plant will supply water for public usage.

3.1 FOUNDATIONS

A. All items of equipment that are floor mounted or rest on the floor or ground shall be installed on concrete foundations. Foundations shall be constructed of concrete, accurate in dimension and neatly hand rubbed and finished. Foundations supporting heavy equipment such as turbine pumps shall be 4,000 PSI concrete. Reinforcing shall be installed as shown and sized on the plans.

3.2 PIPING

A. Piping, valves, and accessories shall be installed as shown on the drawings and in accordance with specifications.

3.3 EQUIPMENT

A. Shall be installed in accordance with the manufacturer's directions and shop drawings. After installation, equipment shall be inspected by a representative of the manufacturer who shall furnish the Engineer a certificate that the equipment has been installed properly and will perform as specified.

END OF SECTION

INDEX TO

SECTION 22 42 50 – PIPE IDENTIFICATION

SECTION 22 42 50

PIPE IDENTIFICATION

PART ONE – GENERAL:

1.01 IDENTIFICATION OF PIPING:

A. General:

1. The following piping system shall be provided with identification as hereinafter specified:

MARKER PIPING SYSTEM	MARKER BACKGROUND COLOR	LETTERS
Domestic Cold Water Supply	Green	White
Domestic Hot Water Supply	Yellow	Black
Domestic Hot Water Circulation	Yellow	Black
Gas Piping	Yellow	Black
Sludge	Yellow	Black
Air Piping	Yellow	Black
Reuse Water	Purple	Black

B. The legend and letter colors for the pipe marking system shall be in accordance with applicable provisions of ANSI Standard A13.1-1981.

C. Shop drawings submitted to the Architect/Engineer shall show complete details of the marking system, including colors and legends.

D. Marking System:

1. All piping that is accessible for maintenance operations (except piping in finished spaces) will be identified with semi-rigid plastic (not pressure-sensitive) identification markers.

2. Direction of flow arrows are to be included on each marker unless otherwise specified.

3. In conformance with "Scheme for the Identification of Piping System" (ANSI A13.1-1981), each marker must show:

   a. Approved color-coded background.
   b. Proper color of legend in relation to background color.
   c. Approved legend letter size.
   d. Approved marker length.

4. Locations for pipe markers shall be as follows:

   a. Adjust to each valve and fitting (except on plumbing fixtures and equipment).

b. At each pipe passage through wall, floor, and ceiling construction.
c. At each passage to underground.
d. On all horizontal pipe runs - marked every 25 feet.

5. Pipe marking shall be as follows:

a. SETMARK Type SNA markers on pipes 3/4" thru 5" (Snap On).
b. SETMARK Type STR markers on pipes 6" and larger (Snap On).
c. Pipe identification system shall be SETMARK outdoor grade plastic acrylic.
d. Pipe markers as manufactured by Seton Nameplate Co., New Haven, CT 06506 (1-800-243-6624) or approved equal. Equal products by Brady Corp. (1-800-635-7557).

6. For pipes under 3/4" O.D. (too small for color bands and legends), brass identification tags 1 1/2" in diameter with depressed 1/3" high black-filled letters above 1/2" black-filled numbers will be fastened securely at specified locations.

END OF SECTION 22 42 50

INDEX TO

SECTION 22 45 00 – EMERGENCY EYEWASH AND SHOWER UNITS

SECTION 22 45 00

EMERGENCY EYEWASH AND SHOWER UNITS

PART 1-GENERAL

1.01 DESCRIPTION

A. This section specifies emergency eyewash and shower units for indoor and outdoor use.

PART 2-PRODUCTS

2.01 EYEWASH AND SHOWER UNITS

A. INDOOR UNITS:

Indoor units shall be Haws 8300, Western 9304, or equal.

B. OUTDOOR UNITS:

Outdoor units shall be Haws 8300-FP, Western 9306, or equal.

2.02 PRODUCT DATA

A. Manufacturer's catalog data shall be submitted for approval.

PART 3-EXECUTION

3.01 INSTALLATION

A. Outdoor eyewash and shower units shall be provided with supply valves and drains buried a minimum depth of 18 inches below ground.

END OF SECTION

INDEX TO

SECTION 23 45 00 – AUTOMATIC SAMPLING EQUIPMENT

SECTION 23 45 00

AUTOMATIC SAMPLING EQUIPMENT

PART 1 – GENERAL

1.01 RELATED WORK

A. Division 22 – Mechanical
B. Division 25 – SCADA
C. Division 26 – Electrical

1.02 SCOPE

A. Furnish and install two (2) automatic liquid samplers; one (1) for the plant influent and one (1) for the plant effluent as shown on the Drawings and described in the Specifications.

1.03 TOOLS AND TEST EQUIPMENT

A. Six (6) complete sets of Operation and Maintence Manuals shall be provided.

1.04 SPARE PARTS

A. Miscellaneous Spare Parts

1. One (1) year supply of the manufacturer's recommended spare parts for the equipment furnished.

2. The spares listed above shall be packed in a manner suitable for long–term storage and shall be adequately protected against corrosion, humidity and temperature.

1.05 EQUIPMENT MANUFACTURER

A. Manufacturer for flow metering equipment are as follows:

1. The sampler shall be **N-CON Model Sentinel M96** Automatic Liquid sample.

PART 2 – PRODUCTS

2.01 The sampler shall be the flow through dipper type. The sampler shall be capable of representatively collecting and preserving by refrigeration liquid samples.

2.02 The refrigerated sampler cabinet shall be constructed of corrosion resistant, resin transfer molded fiberglass. The sample compartment door shall have a compressible gasket seal and positive mechanical latch.

2.03 The sampler shall be capable of receiving a 5–50 gpm flow. The sample chamber shall have a 2–inch Schedule 80–PVC inlet and 3–inch Schedule–80 PVC outlet. The sampler shall be equipped with an adjustable weir plate to provide a constant liquid level within the chamber. The sample chamber shall have a lift–off clear cover. The sample compartment shall be lockable.

2.04 The sample chamber tub shall be a single molded piece without wall and floor seams.

2.05 Refrigeration temperature shall be maintained at 39 degrees F (4 degrees C) in 120 degrees F (49 degrees C) ambient conditions and controlled by a hermetically sealed air sensing thermostat. The refrigerator shall be equipped with a 1/6 hp compressor, fan cooled condenser, front ventilation, and silver brazed connections. All refrigeration components and copper plumbing shall be protected with a phenolic resin coating.

2.06 A cam operated dipper assembly with a 25–mL sample volume shall rotate through a 90-degree cycle with every initiation from the sampler's timer/controller or an external flow meter signal. The sample shall be delivered through a sealed 1–5/8–inch diameter transfer tube to the sample container located within the refrigerated sample compartment.

2.07 The sample volume shall be 25–mL per cycle and may be multiplied each interval from 1 to 99. It shall be possible to preset the number of samples from 24 to 288 to be taken in composite mode. Sampler operation shall terminate automatically with a completed sample program and shall be accomplished electronically with no switch or sensor coming in contact with the liquid. A front panel light shall indicate the completed program condition.

2.08 It shall be possible to manually initial a sample cycle without interrupting the program. There shall also be provision to delay the sampling program 1 to 9999 minutes.

2.09 The samples shall have the built–in and switch selectable capability for both timed cycle and flow proportional sampling. The interval shall be adjustable from 1 to 9999 minutes in one–minute increments. In the flow proportional mode, the sample shall have both the capability to accumulate 1 to 9999 contact closures or receive a 4–20 mA signal.

2.10 The sampler shall operate as a composite unit.

2.11 The sampler shall be provided with one (1) 3–gallon polyethylene composite container.

2.12 The sampler shall operate from 115 Vac, 60 Hz power.

2.13 Exterior dimension of the sampler shall not exceed 52.25" x 19" x 20.5".

2.14 The sampler shall be supplied with flanged fittings for the 2–inch inlet and the 3–inch outlet connections.

2.15 The sampler shall be supplied with a 4–20 mA input capability for flow paces sampling from an external flow meter.

2.16 All parts and components of the sampler shall be suitable for exterior installation in a corrosive environment.

2.17 All necessary SCAD contacts required by Division 25 shall be included with the samplers.

PART 3 – EXECUTION

3.01 GENERAL

A. All components shall be installed and tested in accordance with the manufacturer's written instructions.

3.02 INSTALLATION

A. The Contractor is responsible for the complete furnishing and installation of both the influent and effluent samplers. The Contractor is responsible for supplying the required inlet and outlet piping for withdrawal and disposal of the sample. The Contract is responsible for all electrical and instrumentation connections.

3.03 WARRANTY

A. All components shall be warranted one year from the final acceptance of the system.

END OF SECTION

INDEX TO

SECTION 25 50 00

PLANT SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) SYSTEM

SECTION 25 50 00

SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) SYSTEM

PART 1 – GENERAL

1.01 SCOPE OF WORK:

A. Attention is drawn to the requirement that the "Plant SCADA System" and the "Plant Fiber Optics Network and Instrumentation" shall be furnished by two separate vendors: the SCADA System Integrator (SSI) and the Instrumentation and Fiber Optics Network Integrator (ICSI). The specific roles of these two integrators are specified below.

B. The SCADA System Integrator (SSI): **(Emerson)**
1. Shall be engaged and contracted directly by the General Contractor.
2. Shall furnish and fully commission the plant Local Control Panels (LCPs i.e. "SCADA Panels"), all SCADA software, SCADA hardware, SCADA network configuration, and all system configuration and system integration of the equipment they furnish for the Travis Field Water Reclamation Facility. Work performed by the SCADA System Integrator (SSI) shall also include system integration of the new Travis Field WRF SCADA system data into the Owner's existing city-wide SCADA system.
3. Shall perform onsite startup and thorough testing of all systems while working onsite with the Contractor, various subcontractors, and the Instrumentation and Control System Integrator (ICSI.
4. Shall furnish Record Prints for all SCADA or RTU panels they supply and/or modify under their contract with the General Contractor for this project.
5. Shall furnish a System Diagram depicting the "As Installed" configuration of the plant SCADA system as furnished.
6. Shall coordinate the interface to the SCADA system of data from programmable logic controllers (PLCs) supplied by various equipment suppliers such as chemical feed pump suppliers, motor control center suppliers, the MBR supplier, MBR supplier's System Integrator, and other related equipment supplied by various vendors for this project.
7. Shall furnish all labor, materials, equipment, and services required to install and place into correct operation the SCADA equipment and controls specified herein, as shown on the Contract Drawings and as needed to provide a fully functional and fully operational system.
8. Shall be responsible for the satisfactory design, installation, programming, and commissioning of a complete and fully operational SCADA system that fully complies with the specifications within this document and regulatory requirements and the City of Savannah's specific requirements.
9. Shall provide hardware and software including firewalls, network security systems, or any other internet access security means as required to provide secure remote SCADA system access.
10. Again, this work shall be performed, and hardware and software furnished by the SCADA System Integrator (SSI) under their contract with the GC.

C. The Instrumentation and Fiber Network Integrator (IFNI): (**MR Systems** or Approved Equal)

1. Shall furnish and commission field instruments and required accessories that are not being supplied as part of vendor-furnished systems as defined herein.
2. Shall furnish the fiber optics cable and fiber optics termination/networking panels (FOTPs) with integral networking hardware as required to meet the City of Savannah's SCADA specifications. Network hardware shall be furnished to the Instrumentation and Control System Integrator by the City of Savannah's SCADA Department.
3. Shall perform OTDR testing of the fiber optics cable "on the reel" prior to installation by the Contractor.
4. After the fiber optics cable has been installed by the Contractor, the Instrumentation and Fiber Network Integrator (IFNI) shall "connectorize" the fiber optics cable and perform OTDR testing to certify that the cable has not been damaged during installation. Test results shall be provided to the Engineer and Owner.
5. Shall furnish Operations and Maintenance Manuals for the various field instruments supplied by the Instrumentation and Fiber Network Integrator (IFNI).
6. Shall furnish a Fiber Optics System Network Diagram depicting the "As Installed" configuration of the SCADA and plant network. This network diagram shall include both fiber optics, wireless, and copper (Cat 6) networking.
7. Shall furnish electrical elementaries for the Fiber Optics Termination/Networking Panels.
8. Shall include a Bid Allowance amount of **$16,000.00** for purchase of the Operators Console specified below and two (2) office chairs to be selected by the Owner.
9. Shall include in their price, two (2) scheduled maintenance trips for inspection and calibrations of the supplied system during the warranty period. Maintenance trips shall each be one (1), 8-hour day with the first being scheduled six months after substantial completion and the second being eleven (11) months from the same date. All labor, travel and living costs associated to these two (2) days shall be included in the Contractors bid. Service shall be performed by qualified service technicians.

1.02 QUALIFICATIONS OF SCADA SYSTEM INTEGRATOR (SSI) AND INSTRUMENTAION AND CONTROL SYSTEM INTEGRATOR (ICSI)

A. The SCADA System Integrator (SSI) and Instrumentation and Fiber Network Integrator (IFNI) shall coordinate fully with the Engineer's requirements.

B. All control system integration designed by SCADA System Integrator (SSI) or by the Instrumentation and Fiber Network Integrator (IFNI) firm shall be performed under the direct supervision of a Registered Professional Engineer licensed in the State of Georgia.

C. The SCADA System Integrator (SSI) and the Instrumentation and Fiber Network Integrator (IFNI) shall be regularly engaged in the type of work called for and have the resources to successfully execute the work. Resources shall be defined as capital facilities, personnel, and service. System Supplier shall have successfully

completed the installation of control systems of a similar magnitude and complexity and be able to furnish experience records and personnel contacts for each installation upon request.

D. The SCADA System Integrator (SSI) shall be responsible for the detailed design, technical supervision for installation, field connections to equipment, and the proper functioning of the SCADA system to be furnished under these Specifications.

E. The Instrumentation and Fiber Network Integrator (IFNI) shall have in its employ a permanent field service organization capable of providing the service and maintenance for the supplied system.

F. The Instrumentation and Fiber Network Integrator (IFNI) must have a field service location with a full-time staff located within a 75-mile radius of the jobsite.

G. All equipment furnished shall be of the latest proven design. The system shall be expandable to include future sites and equipment and shall be non-proprietary such that future equipment could communicate with installed equipment.

H. Qualifications Statements: The I Instrumentation and Fiber Network Integrator's (IFNI) personnel must have a minimum of ten years of experience in the design, programming, and start-up of instrumentation and control systems and SCADA systems for the municipal water and wastewater industry.

I. The pre-approved SCADA System Integrator (SSI) is Emerson Process Management, Power and Water Solutions.

J. The pre-approved Instrumentation and Fiber Network Integrator (IFNI) is MR Systems, Inc. of Norcross, Georgia.

1.03 SUBMITTAL REQUIREMENTS

A. Submit proposed hardware and software for all products offered.

1.04 SPARE PARTS

A. Spare parts shall be provided for all components so there is one spare for every five like items or part thereof.

B. All spares shall be packed in a manner suitable for long-term storage and shall be adequately protected against corrosion, humidity and temperatures.

C. Storage and handling instructions shall be provided with each spare part.

D. One year's supply of calibration equipment, etc., as required for the equipment being supplied, shall be provided. Items with less than one year's shelf life shall be provided at required intervals to ensure reliable systems operation throughout the first year following system acceptance.

1.05 FUNCTIONAL DESCRIPTION OF CONTROL SYSTEM

A. General Programming Requirements:

1. All logic, data conversion, arithmetic, and control routines shall be programmed in the PLC located in the RTU itself and not in the SCADA software. The intent of this specification is that the SCADA software shall poll the PLC for all incoming data values and that minimal logic, data conversion, arithmetic, and control routines shall be programmed into the SCADA software. Any and all adjustments to operating Set points and parameters may be limited by the System Supervisor or Plant operator using the login and password security on the SCADA system, giving each operator a specific and appropriate level of control on the system.

2. Where requested by the Owner, all input, output, and data points, collected or controlled, at each SCADA panel shall also be communicated, recorded, displayed, or made available as an alarm at the SCADA server.

B. Plant Site Fiber Optic Communications Network:

1. Provide and install a multimode fiber optic network using Corning 50 micron, OM4 fiber optics cable to connect the following control panels to the plant-wide SCADA system Ethernet network.

Tag	Description & Location	SCADA Interface	Furnished By:
FOTP-IPS	Fiber Optics Termination/Network Panel at Influent Pump Station	Plant SCADA Network (Fiber Optics)	Instrumentation and Fiber Network Integrator (IFNI, MR Systems)
RTU-IPS	Existing Emerson RTU at the Influent Pump Station	FOTP-IPS - Plant SCADA Network (Fiber Optics)	This panel to be replaced or modified as required by the SCADA System Integrator (SSI, Emerson)
FOTP-HW	Fiber Optics Termination/Network Panel at Headworks, Drum Screens	Plant SCADA Network (Fiber Optics)	Instrumentation and Fiber Network Integrator (IFNI, MR Systems)
FCP-HW	Field Control Panel for Headworks Area	Hardwire I/O	Equipment Vendor (Parkson)
LCP-HW	SCADA Panel at Headworks Area	FOTP-HW - Plant SCADA Network (Fiber Optics)	SCADA System Integrator (SSI, Emerson)
FCP-VGR	Field Control Panel for Vortex Grit Removal Area	Hardwire I/O	Equipment Vendor (Hydro)
FOTP-MCCR	Fiber Optics Termination/Network Panel in MCC Room	Plant SCADA Network (Fiber Optics)	Instrumentation and Fiber Network Integrator (IFNI, MR

Tag	Description & Location	SCADA Interface	Furnished By:
			Systems)
LCP-MCCR	SCADA Panel in MCC Room	Cat 6 (Ethernet) to Fiber Optics/Network Panel (FOTP-MCCR) in MCC Room	SCADA System Integrator (SSI, Emerson)
FOTP-MBR	Fiber Optics Termination/Network Panel in the Control Room	Plant SCADA Network (50 micron, OM4 Fiber Optics Cable)	Instrumentation and Fiber Network Integrator (IFNI, MR Systems)
FCP-MBR	MBR System Field Control Panel with SCADA Operator Interface Terminal for Control Rom	Cat 6 (Ethernet) to Network Interface Panel in Control Room	Kubota (MR Systems)
FCP-UV	Field Control Panel for UV System #1	Ethernet (Cat6) Cable to FOTP-HW	Equipment Vendor (Enaqua)
EFFL-SAMP	Effluent Sampler	4 to 20 mA Pacing Signal from LCP-HW	Equipment Supplier
VFD-PE1	VFD for Plant Effluent Pump #1 in MCC Room	Ethernet (Cat6) Cable to FOTP-MCCR	Contractor
VFD-PE2	VFD for Plant Effluent Pump #2 in MCC Room	Ethernet (Cat6) Cable to FOTP-MCCR	Contractor
VFD-PE3	VFD for Plant Effluent Pump #3 MCC Room	Ethernet (Cat6) Cable to FOTP-MCCR	Contractor
VFD-PE4	Future VFD for Plant Effluent Pump #4 MCC Room	Ethernet (Cat6) Cable to FOTP-MCCR	Future
FCP-RWPS	Field Control Panel at Plant Reuse Water Pump Station	Hardwire I/O to LCPHW Ethernet (Cat6) Cable to FOTP-HW	Equipment Vendor (SyncroFlo)
FCP-SC	Field Control Panel at Speece Cone (Effluent DO Improvement System)	Ethernet (Cat6) Cable to FOTP-HW	Equipment Vendor (ECO2)
VFD-PDP-1	Plant Drain Pump No. 1 VFD	Hardwired to LCP-MCCR and Ethernet (Cat6) Cable to FOTP-MCCR	Contractor
VFD-PDP-2	Plant Drain Pump No. 2 VFD	Hardwired to LCP-MCCR and Ethernet (Cat6) Cable to FOTP-MCCR	Contractor
FOTP-L/A	Fiber Optics	Plant SCADA	Instrumentation and

Tag	Description & Location	SCADA Interface	Furnished By:
	Termination/Network Panel at Lime/Alum Building	Network (50 micron, OM4 Fiber Optics Cable)	Fiber Network Integrator (IFNI, MR Systems)
FCP-L/A	Field Control Panel at Lime Slurry/Alum Area	Hardwired to LCP-MCCR	Equipment Vendor (Burnett Lime)
FOTP-BFP	Fiber Optics Termination/Network Panel in Belt/Filter Press Building	Plant SCADA Network (50 micron, OM4 Fiber Optics Cable)	Instrumentation and Fiber Network Integrator (IFNI, MR Systems)
LCP-BFP	SCADA Panel in Belt/Filter Press Building	Cat 6 (Ethernet) to Fiber Optics/Network Panel (FOTP-BFP)	SCADA System Integrator (SSI, Emerson)
FCP-BFP	Field Control Panel at Sludge Dewatering Building	Hardwired to LCP-MCCR	Existing Panel furnished by the City of Savannah
FCP-EG1	Field Control Panel for Generator No. 1	Cat 6 (Ethernet) to Fiber Optics/Network Termination Panel (FOTP-BFP)	Equipment Vendor
FCP-EG2	Field Control Panel for Generator No. 1	Cat 6 (Ethernet) to Fiber Optics/Network Termination Panel (FOTP-BFP)	Equipment Vendor
Operators' Console	Control Room	Not Applicable.	Instrumentation and Fiber Network Integrator (IFNI, MR Systems)

C. Field Instruments to be Supplied by Instrumentation and Fiber Network Integrator (IFNI)

1. Where indicated, field instruments and accessories not furnished as part of vendor-furnished packages shall be supplied by the Instrumentation and Fiber Network Integrator (IFNI).

2. Furnish each field instrument component furnish a stainless-steel nameplate with engraved Instrument Tag and calibrated instrument range. For example, an ultrasonic level transmitter and level transmitter shall be furnished with two stainless steel tags. One for the ultrasonic level transducer and one for the ultrasonic level transmitter.

3. Each field-mounted AC Power and Analog Surge Protector shall be furnished with a stainless-steel nametag engraved with the Instrument Tag for the surge protector.

Instrument Tag	Description	Range	Comments
LE-101	Ultrasonic Level Transducer	0 to 30 ft.	Provide Submergence Shield and 30 ft. of cable.
LIT-101	Ultrasonic Level Transmitter	N/A	Provide Aluminum Solar Hood.
FSP-101	AC Power and Analog Surge Protector	N/A	Field-mounted
LSHH-101	Float Type Level Switch	3 to 30 ft.	Supply 50 ft. of Cable.
LSLL-101	Float Type Level Switch	3 to 30 ft.	Supply 50 ft. of Cable.
FSP-107	AC Power and Analog Surge Protector for Existing FE/FIT-107 Magnetic Flowmeter	N/A	Field-mounted at existing Magmeter.
FE-108	24" Magnetic Flowmeter Body	0 to 24 MGD	Provide two (2) Stainless Steel Grounding Rings.
FIT-108	Magnetic Flowmeter Transmitter	N/A	Provide Aluminum Solar Hood.
FSP-108	AC Power and Analog Surge Protector	N/A	Field-mounted
FSP-201	AC Power and Analog Surge Protector for Influent Sampler	N/A	Field-mounted
LE-403	Ultrasonic Level Transducer	0 to 30 ft.	Provide Submergence Shield and 30 ft. of cable.
LIT-403	Ultrasonic Level Transmitter	N/A	Provide Aluminum Solar Hood.
FSP-403	AC Power and Analog Surge Protector	N/A	Field-mounted
LSHH-403	Float Type Level Switch	3 to 30 ft.	Supply 50 ft. of Cable.
LSLL-403	Float Type Level Switch	3 to 30 ft.	Supply 50 ft. of Cable.
FE-408	12" Magnetic Flowmeter Body	0 to 18 MGD	Provide two (2) Stainless Steel Grounding Rings.
FIT-408	Magnetic Flowmeter Transmitter	N/A	Provide Aluminum Solar Hood.
FSP-408	AC Power and Analog Surge Protector	N/A	Field-mounted
LE-701	Ultrasonic Level Transducer	0 to 30 ft.	Provide Submergence Shield and 30 ft. of cable.
LIT-701	Ultrasonic Level Transmitter	N/A	Provide Aluminum Solar Hood.
FSP-701	AC Power and Analog Surge	N/A	Field-mounted

	Protector		
LSHH-701	Float Type Level Switch	3 to 30 ft.	Supply 50 ft. of Cable.
LSLL-701	Float Type Level Switch	3 to 30 ft.	Supply 50 ft. of Cable.
AE-707	Dissolved Oxygen Sensor	0 to 10 ppM	Mounts under cover; No solar hood required. Verify Sensor type (flow-thru or Insertion.)
AIT-707	Dissolved Oxygen Analyzer/Transmitter	0 to 10 ppM	Mounts under cover; No solar hood required.
FSP-707	AC Power and Analog Surge Protector	N/A	Field-mounted
FE-708	24" Magnetic Flowmeter Body	0 to 24 MGD	Provide two (2) Stainless Steel Grounding Rings.
FIT-708	Magnetic Flowmeter Transmitter	N/A	Provide Aluminum Solar Hood.
FSP-708	AC Power and Analog Surge Protector	N/A	Field-mounted
LE-1001	Ultrasonic Level Transducer	0 to 30 ft.	Supplied by Provide Submergence Shield and 30 ft. of cable.
LIT-1001	Ultrasonic Level Transmitter	N/A	Mounts in Xylem (Flyght) Control Panel.
FSP-1001	AC Power and Analog Surge Protector	N/A	Field-mounted
LSHH-1001	Float Type Level Switch	3 to 30 ft.	Supply 50 ft. of Cable.
LSLL-1001	Float Type Level Switch	3 to 30 ft.	Supply 50 ft. of Cable.
FE-1201	6" Magnetic Flowmeter Body	0 to 6 MGD	Provide two (2) Stainless Steel Grounding Rings.
FIT-1201	Magnetic Flowmeter Transmitter	N/A	Supply cable length as require. No solar hood required since transmitter mounts indoors.
FSP-1201	AC Power and Analog Surge Protector	N/A	Field-mounted

PART 2 – PRODUCTS

2.01 GENERAL

A. SCADA hardware and programming services for this project shall be furnished by the city's SCADA System Integrator (SSI - Emerson) under a direct contract with the general contractor.

1. The SCADA System Integrator (SSI, Emerson) shall be retained by the GC to furnish all SCADA system hardware, SCADA software, and System Integration Services as required for the successful completion of this project.

2. It shall be the responsibility of the SCADA System Integrator (SSI, Emerson) to perform the following tasks:

   a. Thoroughly review all plans and specifications to gain a complete understanding of the overall requirements for the construction of this treatment facility and the specific scope of work required to be completed by the SCADA System Integrator (SSI, Emerson).
   b. Recommend to the City of Savannah the required SCADA I/O panels and/or Remote Telemetry Units necessary for communications with the following vendor furnished factory control panels or hardwired I/O from discrete instruments, field control panels or other systems:
      1. Plant Influent Pump Station with existing Emerson RTU (RTU-IPS). This panel is to be modified or replaced as determined by Emerson Process.
      2. Headworks Screens equipment, by Parkson, including a Field Control Panel (FCP-HW), four (4) Drum Screens, four (4) Compactors, and two (2) motor operated valves.
      3. Headworks Vortex Grit Removal system and Grit Classifier system with new Field Control Panel (FCP-VGF) by WEMCO.
      4. Plant Equalization Tank level monitoring, four (4) associated Equalization Pumps (Flight) with Variable Frequency Drives, and a Field Control Panel (FCP-EQPS).
      5. MBR System with Field Control Panel (FCP-MBR) all furnished by Kubota with SCADA by MR Systems.)
      6. UV Disinfection System including three (3) UV systems and three (3) Field Control Panels (FCP-UV1, PCP-UV2 and FCP-UV3) all furnished by Enaqua.
      7. Plant Effluent Pump Station with Wet Well, four (4) Plant Effluent Pumps (Peerless) each with a VFD, associated wet well level monitoring instrumentation, dissolved oxygen analyzer/transmitter and Plant Effluent Flowmeter.
      8. Plant Reuse Water Pump Station with two Pumps (by SynchroFlo) and associated flow metering.
      9. Effluent Dissolved Oxygen Improvement System with two (2) feed pumps, two (2) compressors, Speece Cone, and Field Control Panel (FCP-SC).
      10. Plant Drain Pump Station with Wet Well level monitoring and two (2) Flyght pumps each with a VFD.
      11. Lime and Alum chemical feed systems with Field Control Panel (FCP0Lime/Alum) all furnished by Burnett Lime.
      12. The Owner's existing Belt Filter Press system with sludge feed, water booster pump, Polymer Feed Pump, Dry Sludge Feed pump, and Field Control Panel (FCP-BFP) will be reused at this plant.
      13. Two (2) Emergency Generators, associated

transfer/switching equipment, and two (2) Field Control Panels (FCP-EG1 and FCP-EG2).

B. Communications

1. Plant Control Network Scope of Work:

   a. The plant control communications networks shall consist of an industrial Ethernet network running primarily over 50-micron (OM4) fiber optics cable using ST connectors.

   b. Ethernet fiber optics switches to be Juniper E2300 Series with 2 FX and 12 Copper Ethernet ports.

   c. The plant fiber network shall be supplied, installed, terminated, and programmed by the Instrumentation and Fiber Network Integrator (IFNI).

2. Documentation:

   a. The Instrumentation and Fiber Network Integrator (IFNI) shall submit a proposed network diagram including all nodes and links between nodes, with descriptions of proposed addressing schemes and any network or device configuration information with the system submittals. At commissioning, the Instrumentation and Fiber Network Integrator (IFNI) shall supply an As-Built network diagram providing all of the information above as well as any other pertinent network information with the system O&M manuals.

3. Components:

   a. Industrial Ethernet Switches: Ethernet switches shall be industrial type DIN-Rail mounted devices powered by an industrial 24VDC power supply. Power supply wiring shall be plug-in screw terminal type terminal blocks. Devices using plug-in transformers or pig-tail type plugs will not be acceptable. Switches may be either managed or unmanaged type store-and-forward switches. Network connection to the device shall be by standard RJ45 ports connecting to CAT5E twisted pair cable for copper connections, or by standard SC or ST duplex connectors for multimode fiber optic connections. An Ethernet switch shall be located in each panel supplied for the Plant site. All switches supplied under this contract shall be identical. All switches shall have a minimum of two duplex fiber optic ports per switch, and the sufficient RJ45 copper ports to connect all available equipment in the respective panel plus an available port for maintenance. The switch located in the Main Plant SCADA panel shall also have two connections available for SCADA computers, one for the computer supplied with his project, and one for future expansion. Switches shall be manufactured by Juniper, no exceptions allowed.

   b. Fiber Optic Cable: Fiber optic cable shall be 50-micron multimode cable (OM3) designed for indoor and outdoor use, rated for use in general purpose, riser, aerial, duct, and direct-buried applications. Fiber optic strands shall be color coded and tight-buffered within

the cable and shall not require a fan-out kit of transition splicing for termination. Fiber optic cable water blocking shall be gel-free. Maximum attenuation shall be 3.4B/km. Fiber optic cables supplied under this contract shall have a minimum of three pairs of fibers per cable and shall be terminated with ST type connectors. All network links which extend outside of a building or structure shall use fiber optic cable. Copper network cables shall not extend outside any building or structure. Careful attention shall be paid to not damage the fiber optic cable during installation; all pulling, bend, and conduit for fiber optic cable shall be per manufacturer's recommendations. Any fiber optic cable which is damaged by installation shall be removed and replaced in its entirety. No splices shall be permitted in fiber optic cables. Fiber optic cable shall be manufactured by Corning.

c. Copper Ethernet Cable: Copper Ethernet cables shall be a minimum CAT6 twisted pair type with RJ45 connectors with snag less boots. Patch cables used within control panels shall be minimum 24 AWG, pre-terminated patch cables. Network cables extending outside of control panels (e.g. connecting the SCADA computer to the plant network) shall be minimum 24 AWG and provided with a proper strain-relief hub or bushing and may be field terminated. Under no circumstances shall copper Ethernet cables extend outside a building or structure. Copper Ethernet Cables shall be as manufactured by Belden, Black Box, Mohawk, or approved equivalent.

2.02 OPERATORS CONTROL CONSOLE

A. The Instrumentation and Fiber Network Integrator (IFNI) shall furnish one (1) Operators Control Console to be installed by the Contractor in the Control Room of the Operations Building.

B. The Operators Control Console shall be manufactured by Winsted Corporation of Minneapolis, Minnesota and, as a minimum, shall be constructed of the following components. The Owner shall select all colors. The Instrumentation and Control System Integrator shall include a **Bid Allowance of $16,000.00** for the Operators Console and two (2) office chairs to be selected by the Owner.

1. Two (2) Single Bay Stringers Model # 56002.
2. One (1) Double Bay Stringer, Model #56004.
3. Four (4) Work Surface Support Brackets, Model #56262.
4. Four (4) Vented Doors, Model #56302.
5. Two (2) Single Bay Hinged Covers, Model #64042.
6. One (1) Double Bay Hinged Covers, Model #64053.
7. Two (2) 45 Degree Hinged Covers, Model #64053.
8. One (1) Pair Insight End Frames, Model #64061.
9. Four (1) Insight Intermediate Frame, Model #64062.
10. Four (4) Bottom Shelves, Model #64082.
11. Four (4) Lift Off Panels, Model #64100.
12. Two (2) 45 Degree Corners, Model #64183.

13. One (1) Pair Shark Gray Side Panels, Model #64520.
14. Two (2) 1-Bay Endurance+ 20" Deep, Model #64672.
15. One (1) 2-Bay Endurance+ 20" Deep, Model #64674.
16. Two (2) 45 Degree Endurance+ Work Surface, Model #64683.
17. Three (3) Single LCD Pole Mount, Model #W6471.

PART 3 – SOFTWARE

3.01 GENERAL

A. When multiple copies are provided if the same package, all versions shall be identical.

B. The SCADA System Integrator (SSI, Emerson) shall be responsible for providing and installing the software as required.

C. The programming and configuration of the software shall be by the Instrumentation and SCADA System Integrator (SSI, Emerson) similar to the Owners existing software.

D. All software licenses shall be transferred to the Owner prior to system acceptance by the Owner.

E. SCADA Software Suite: Supervisory Control and Data Acquisition (SCADA) Software shall be provided by Emerson.

1. The primary server SCADA software shall include both run time and full development capabilities. The secondary server SCADA software shall include runtime capabilities at a minimum.

2. The system shall include: Automatic alarm dial-out capabilities with phone, email, and text messaging capabilities.

3. The system shall include a minimum of two simultaneous remote internet client connections.

4. SCADA software shall be commercially available off-the-shelf and shall be non-proprietary, such that independent systems integrators are able to provide configuration and maintenance services as required.

5. Software shall be a Client/Server architecture. No Microsoft Client Access Licenses (CAL) shall be required for full installation (thick) or browser-based (thin) clients. Terminal Services shall not be required.

6. Software licenses shall be upgradable for an annual fee such that the client is able to download the current version of the product.

7. Software shall be tag-based and have an integrated development environment for creation of all aspects of the application.

8. Software shall be compatible with commercially available, off-the-shelf

PC hardware running 64-bit Microsoft Windows client and server operating systems currently available at the time of installation.

9. Software shall not require dedicated server-level PC hardware for any individual system components.

10. Software shall support any computer running a thick copy of the software performing as both an application server and a user interface. Software shall support automatic server failover to an unlimited number of servers.

11. Software shall include the following integrated components. These components shall not require separate software to be installed.

    a. I/O drivers for common industry-standard protocols.
    b. Alarms management and alarms history.
    c. Historian.
    d. Real-time and historical data trend creation.
    e. Report generation.
    f. Application backup and version control.
    g. Security management.
    h. Support for networked applications.
    i. Support for service redundancy.
    j. An object-oriented scripting language with debugging tools.

12. The software manufacturer shall offer, at a minimum, the following optional components.

    a. Browser-based thin clients for PCs and Mobile devices.
    b. Alarm notification (e-mail, text message, and voice).
    c. Interfaces for third-party software programs to access data (real-time and historical) and alarms. Such interfaces may include OPC, ODBC, and SNMP.

13. Software shall compensate for deploying the same application simultaneously on a variety of monitor resolutions, while maintaining the aspect ratios of all displays.

14. Software shall support an automatic, orderly shutdown when switching to UPS backup power and power levels drop to a predefined Set point. Software shall support automatically restart to full operation without user intervention.

15. Software shall provide a mechanism to backup and restore the entire application configuration.

16. Software shall include an integrated security system supporting an unlimited number of user accounts, roles, and privileges. System users with appropriate account privileges shall be capable of changing the application configuration without requiring the software supplier's assistance. No lockout mechanisms or passwords shall be withheld from the final customer.

17. Integrated software help manuals shall be provided to assist operators and maintenance personnel with operation and configuration tasks.

18. SCADA software for the plant instrumentation and control system shall be the latest version compatible with the City of Savannah's existing SCADA/telemetry system as supplied by Emerson Process, Power and Water Solutions.

PART 4 – EXECUTION

4.01 INSTALLATION

A. Installation

1. The Contractor shall engage licensed electricians to install all conduits, communication cables, RTU's, FCPs, LCPs, and all vendor furnished control panels. and final terminations as required for a complete and operational system.

2. The Contractor shall engage licensed electricians to perform the final field terminations of signal and power wiring to all control panels and field instruments.

3. All equipment shall be installed according to the manufacturer's recommendations.

4. Outdoor, new installations shall be stable enough to withstand winds up to 120 miles per hour.

5. All mounting hardware shall be corrosion resistant.

6. All installation shall be in accordance with the local electrical codes.

B. Field Calibration

1. All SCADA System components shall be calibrated in the presence of the Owner in accordance with the range and accuracy specified herein.

2. No form of energy shall be turned on to any part of the SCADA System components prior to approval by the Systems Integrator and Owner.

C. SCADA System Startup

1. The SCADA System Integrator (SSI, Emerson) shall furnish the services of a qualified technical service representative to perform the supervisory service required during start-up of SCADA System components.

2. Services of a field service technician shall be provided for no less than two eight-hour days for the purpose of placing all equipment into operation.

3. The minimum days specified above do not relieve the manufacturer of providing sufficient service to place the system in satisfactory operation.

D. Training

1. The SCADA System Integrator (SSI, Emerson) shall furnish the services of a factory representative for no less than one eight-hour day for the purpose of operator training.

2. Training shall be performed on site.

3. Three months after the system has been placed into operation, the SCADA System Integrator (SSI, Emerson) shall furnish the services of a factory service representative for one eight-hour day to conduct follow-up training with the Owner's personnel. The follow-up training shall be conducted on-site and consist of reviewing the operation and maintenance of the system. The Owner shall be contacted a minimum of two weeks in advance prior to scheduling the training session to allow proper coordination.

PART 5 – WARRANTY AND SERVICE CONTRACT

5.01 WARRANTY

A. The contractor shall provide a one-year warranty on the system. This warranty shall cover defects in material or workmanship.

B. Warranty period shall start on the day of substantial completion and end one year from this date.

5.02 SERVICE CONTRACT

A. The Instrumentation and Fiber Network Integrator (IFNI) shall include in their price, two scheduled maintenance trips for review and calibrations of the supplied instrumentation and fiber optics network over the warranty period. Maintenance trips shall be one, eight-hour day with the first being scheduled six months after commissioning and the second being twelve months from the final commissioning date. All costs associated to these two days shall be included in the Contractor's bid. Service shall be performed by qualified service technicians.

PART 6 – LONG-TERM SUPPORT

6.01 PHONE SUPPORT

A. Scope of Work: Technical phone support for control system equipment: installation, configuration, maintenance, and troubleshooting.

1. Real-time technical phone support by the SCADA System Integrator (SSI, Emerson) shall be available 8 AM-5 PM local time where the support specialist directly answers the call (no call attendants, no call-back).

24x7x365 coverage (includes evenings, weekends, and holidays) shall be available with same-call-access responsiveness or better.

a. Skill Set: Support specialists shall have knowledge of current and legacy software products and related technologies. Includes controllers, drivers, I/O, networks, programming software, communications, information, and application software.

2. Electronic support shall be available to ftp a file, submit an online request, and download a software update or lookup a tech note.

a. Current software releases and reactivation codes shall be available for download from the Internet 24x7. Upon request, overnight shipment of update(s) or replacement media shall be available.

3. Support center shall be able to seamlessly dispatch an on-site engineer if problem warrants (specific response times by region).

6.02 ONSITE SUPPORT

A. Field support engineers are to be made available on an as needed, scheduled, or full-time basis to meet the specific user needs and system maintenance strategy.

B. Callout services for repair and troubleshooting labor as needed for system related issues.

C. Extended parts and labor warranty for repair labor (including local travel) and replacement parts for system control equipment and drives for up to five additional years.

D. Preventative maintenance services to perform regular maintenance on system related equipment to prevent potential problems and extend component and system life.

6.03 TRAINING

A. The SCADA System Integrator (SSI, Emerson) shall provide training programs for multiple job functions on the chosen process control system. These roles include electricians, maintenance technicians, and control systems engineers. The SCADA System Integrator (SSI, Emerson) shall provide various training options including online self-directed classes, onsite instructor led training, and offsite instructor led training.

B. The Instrumentation and Fiber Network Integrator (IFNI) shall provide two (2) 8-hour training sessions to provide instrument training for plant personnel.

C. The Instrumentation and Fiber Network Integrator (IFNI) shall provide one (1) 4-hour training session to provide an overview of the plant fiber optics network for plant personnel.

PART 7 – TABLE OF INSTRUMENTS, LOOPS AND PANELS

7.1 TABLE OF INSTRUMENTS, LOOPS AND PANELS

Tag	Service/Function	Notes/Comments
LSHH-101	Plant Influent PS Wet Well - High-High Level	Float Switch - To be installed by General Contractor.
LSLL-101	Plant Influent PS – Wet Well Low-Low Level	Float Switch - To be installed by the General Contractor.
LE-101	Plant Influent PS - Wet Well Level	Ultrasonic Level Transducer – To be furnished and commissioned by the Instrumentation and Fiber Network Integrator (IFNI – MR Systems) and installed by the General Contractor.
LIT-101	Plant Influent PS - Wet Well Level	Ultrasonic Level Transmitter To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and installed by the General Contractor.
FSP-101	Field-mounted AC Power and Analog Surge Protector	To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and installed by the General Contractor.
Loop 102	Existing Influent Pump No. 1 Controls	New VFD No. 1
Loop 103	Existing Influent Pump No. 2 Controls	New VFD No. 2
Loop 104	Existing Influent Pump No. 3 Controls	New VFD No. 3
Loop 105	Existing Influent Pump No. 4 Controls	New VFD No. 4
Loop 106	Existing Cummins Generator	If required, the SCADA System Integrator (SSI, Emerson) to provide and install a new Communications Module to allow the Emerson SCADA system to communicate with this existing Generator.
FE-107	Magnetic Flowmeter Body	Existing
FIT-107	Magnetic Flow Transmitter	Existing
FSP-107	New Field-mounted AC Power & Analog Surge Protector	To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and installed by the General Contractor.
FE-108	24" Magnetic Flowmeter Body	To be furnished and commissioned by

		Instrumentation and Fiber Network Integrator (IFNI) and installed by the General Contractor.
FIT-108	Magnetic Flow Transmitter	To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and installed by the General Contractor.
FSP-108	New Field-mounted AC Power & Analog Surge Protector	To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and installed by the General Contractor.
Influent Sampler (Loop 201)	Influent Sampler to be furnished per Specifications Section 23 45 00.	Flow pacing signal to be furnished and commissioned by SCADA System integrator (SSI, Emerson).
FCP-HW	Field Control Panel furnished by Parkson per Specifications Section 44 43 34.	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 202	Drum Screen No. 1 to be furnished by Parkson per Specifications Section 44 43 34.	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 203	Compactor No. 1 to be furnished by Parkson per Specifications Section 44 43 34	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 204	Drum Screen No. 2 to be furnished by Parkson per Specifications Section 44 43 34	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 205	Compactor No. 2 to be furnished by Parkson per Specifications Section 44 43 34	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 206	Drum Screen No. 3 to be furnished by Parkson per Specifications Section 44 43 34	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 207	Compactor No. 3 to be furnished by	SCADA System Integrator

	Parkson per Specifications Section 44 43 34	(SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 208	Drum Screen No. 4 to be furnished by Parkson per Specifications Section 44 43 34	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 209	Compactor No. 4 to be furnished by Parkson per Specifications Section 44 43 34	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
MOV-210	Motor Operated Valve (To Vortex Grit Separator) to be furnished by Contractor per Specifications Section 40 29 50.	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
MOV-211	Motor Operated Valve (To EQ Tank or Splitter Box) to be furnished by Contractor per Specifications Section 40 29 50.	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
FCP-VGR	Field Control Panel furnished by Wemco per Specifications Section 46 23 66	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
MOV-303	Motor Operated Valve (To EQ Tank) to be furnished by Contractor per Specifications Section 40 2950	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
MOV-304	Motor Operated Valve (To Anaerobic Basin) to be furnished by Contractor per Specifications Section 40 29 50	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 401	EQ Tank Mixing Pump No. 1	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 402	EQ Tank Mixing Pump No. 2	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
LSHH-403	Equalization Tank - High-High Level	Float Switch - To be installed

		by Electrical Subcontractor.
LSLL-403	Equalization Tank – Low-Low Level	Float Switch - To be installed by Electrical Subcontractor.
LE-403	Equalization Tank - Level	Ultrasonic Level Transducer – To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and to be installed by the General Contractor.
LIT-403	Equalization Tank - Level	Ultrasonic Level Transmitter To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and to be installed by the General Contractor.
FSP-403	Field-mounted AC Power and Analog Surge Protector	To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and to be installed by the General Contractor.
FCP-EQPS	Field Control Panel furnished by Flyght per Specifications Section 33 32 20	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
FOTP-600	Fiber Optics Termination (and Networking) Panel by Instrumentation and Control System Integrator.	
Loop 404	Equalization Pump No. 1	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 405	Equalization Pump No. 2	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 406	Equalization Pump No. 3	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 407	Equalization Pump No. 4	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
FE-408	12" Magnetic Flowmeter Body	New Instrument to be

		furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and to be installed by the General Contractor.
FIT-408	Magnetic Flow Transmitter	New Instrument to be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI, MR Systems) and to be installed by the General Contractor.
FSP-408	New Field-mounted AC Power & Analog Surge Protector	To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI, MR Systems) and to be installed by the General Contractor.
Loops 500 thru 599	All instruments and controls to be furnished and commissioned by Kubota.	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 601	UV System No. 1 to be furnished and commissioned by Enaqua per Specifications Section 44 44 73.	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 602	UV System No. 2 to be furnished and commissioned by Enaqua per Specifications Section 44 44 73	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 603	UV System No. 3 to be furnished and commissioned by Enaqua per Specifications Section 44 44 73.	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
LSHH-701	Plant Effluent and Reuse Water Wet Well - High-High Level	Float Switch - To be installed by General Contractor.
LSLL-701	Plant Effluent and Reuse Water Wet Well - Low-Low Level	Float Switch - To be installed by General Contractor.
LE-701	Plant Effluent and Reuse Water Wet Well - Level	Ultrasonic Level Transducer – To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and to be installed by the General Contractor.
LIT-701	Plant Effluent and Reuse Water Wet Well -	Ultrasonic Level Transmitter

	Level	To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and to be installed by the General Contractor.
FSP-701	Field-mounted AC Power and Analog Surge Protector	To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and to be installed by the General Contractor.
Plant Effluent Sampler (Loop 706)	Plant Effluent Sampler to be furnished per Specifications Section 25 45 00	Flow pacing signal to be furnished and commissioned by SCADA System integrator, SSI, Emerson).
AE-707	Dissolved Oxygen Sensor – Plant Effluent	Dissolved Oxygen Sensor – To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and to be installed by the General Contractor.
AIT-707	Dissolved Oxygen Transmitter – Plant Effluent	Dissolved Oxygen Transmitter – To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and to be installed by the General Contractor.
FSP-707	Field-mounted AC Power and Analog Surge Protector	To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and to be installed by the General Contractor.
FE-708	24" Magnetic Flowmeter Body	To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and to be installed by the General Contractor.
FIT-708	Magnetic Flow Transmitter	To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and to be installed by the General Contractor.
FSP-708	New Field-mounted AC Power & Analog Surge Protector	To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI)

		and to be installed by the General Contractor.
Loop 801	Plant Reuse Water Pump No. 1 to be furnished per Specifications Section 44 42 56	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 802	Plant Reuse Water Pump No. 2 to be furnished per Specifications Section 44 42 56	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 803	Plant Reuse Water Flow - Flowmeter to be furnished per Specifications Section 44 42 56	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 901	Effluent D.O. Improvement – Duty Feed Pump No. 1	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 902	Effluent D.O. Improvement – Duty Feed Pump No. 2	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 903	Effluent D.O. Improvement – Duty Compressor No. 1	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 904	Effluent D.O. Improvement – Duty Compressor No. 2	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 905	Effluent D.O. Improvement System	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
LSHH-1001	Plant Drain PS Wet Well - High-High Level	Float Switch - To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and to be installed by the General Contractor.

LSLL-1001	Plant Drain PS Wet Well - Low-Low Level	Float Switch - To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and to be installed by the General Contractor.
LE-1001	Plant Drain PS Wet Well - Level	Ultrasonic Level Transducer – To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and to be installed by the General Contractor.
LIT-701	Plant Drain PS Wet Well – Level	Ultrasonic Level Transmitter To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and to be installed by the General Contractor.
FSP-1001	Field-mounted AC Power and Analog Surge Protector	To be furnished and commissioned by Instrumentation and Fiber Network Integrator (IFNI) and to be installed by the General Contractor.
Loop 1101	Lime Feed System to be furnished by Burnett Lime per Specifications Section 44 44 59	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System. Dose and pacing signals are required. Coordinate with Owner and Engineer as required.
Loop 1102	Alum Feed System to be furnished by Burnett Lime per Specifications Section 44 44 19	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System. Dose and pacing signals are required. Coordinate with Owner and Engineer as required.
Loop 1201	Sludge Feed Pump to be supplied by Contractor.	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 1202	Water Booster Pump to be supplied by Contractor.	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O

		signals and controls into SCADA System.
Loop 1203	Belt Filter Press to be furnished by Owner for installation and commissioning by Contractor. See Specifications Section 31 23 19	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 1204	Polymer Feed Pump to be supplied by Contractor.	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 1205	Dry Sludge Feed Pump to be supplied by Contractor.	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 1301	Emergency Generator No. 1 to be supplied by Contractor per Specifications Section 26 32 13	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.
Loop 1302	Emergency Generator No. 2 to be supplied by Contractor per Specifications Section 26 32 13	SCADA System Integrator (SSI, Emerson) to incorporate all available I/O signals and controls into SCADA System.

END OF SECTION

INDEX TO

SECTION 31 00 00 – EARTHWORK

SECTION 31 00 00

EARTHWORK

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Grading.

B. Excavation.

C. Backfilling.

D. Compaction.

E. Remove and Replace Topsoil.

F. Dressing of Shoulders and Banks.

G. Water Control.

H. Testing.

1.02 RELATED SECTIONS

A. Section 01 45 00 – Quality Control.

B. Section 01 45 23 – Testing and Inspecting Services.

C. Section 31 10 00 – Site Clearing.

1.03 REFERENCES (LATEST REVISION)

A. ASTM D 448 – Sizes of Aggregate for Road and Bridge Construction.

B. ASTM D 1557 – Laboratory Compaction Characteristics of Soil Using Modified Effort.

C. ASTM D 2487 – Classification of Soils for Engineering Purposes (Unified Soil Classification System).

D. ASTM D 6938 – In–Place Density and Water Content of Soil and Soil–Aggregate by Nuclear Methods (Shallow Depth).

E. ASTM D 3740 – Minimum Requirements for Agencies Engaged in Testing and Inspection of Soil and Rock as Used in Engineering Design and Construction.

F. ASTM E 329 – Agencies Engaged in Construction Inspection and Testing.

1.04 SUBMITTALS

A. Section 01 00 00 – General Requirements: Procedures for submittals.

B. Materials Source: Submit gradation analysis, proctor results, and soil classification for all borrow material.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with Federal, State of Georgia, and City of Savannah standards.

1.06 TESTING

A. Laboratory tests for moisture density relationship for fill materials shall be in accordance with ASTM D 1557, (Modified Proctor).

B. In place density tests in accordance with ASTM D 6938.

C. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.

D. The testing laboratory and Project Engineer or Project Representative shall be given a minimum of 48 hours notice prior to taking any of the tests.

E. Testing shall be Contractor's responsibility and performed at Contractor's expense by a commercial testing laboratory operating in accordance with subparagraph C above.

F. Acceptable test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Controlled fill shall consist of sand or sand–clay soils capable of being readily shaped and compacted to the required densities, and shall be reasonably free of roots, trash, rocks larger than two inches, and other deleterious material.

B. All soils used for structural fills shall have a PI (plastic index) of less than ten, and a LL (liquid limit) of less than 30. Fill soils shall be dried or wetted to appropriate moisture contents prior to compaction. Additionally, fill soils used for the top two feet of fill beneath roads and parking lots shall have no more than twelve percent passing the # 200 sieve.

C. Controlled fill material should be cohesion-less soil containing no more than twelve percent fines (material passing the No. 200 sieve) by weight, having a maximum dry density of at least 100 pcf as determined by a laboratory modified Proctor compaction test (ASTM D 1557). The soil should be relatively free of organics, deleterious matter, and elongated or flat particles susceptible to

degradation. All fill should be placed in uniform lifts of ten inches or less (loose measure) and compacted to at least 95% of the modified Proctor maximum dry density. (ASTM D-1557).

Fill placement should be observed by a qualified Engineering Technician working under the direction of the Geotechnical Engineer. In addition to this visual evaluation, the Technician should perform a sufficient number of in-place field density tests to confirm the contractor's equipment and methods are capable of achieving the required degree of compaction.

D. Contractor shall furnish all fill material.

E. Contractor shall be responsible for and bear all expenses in developing borrow sources including securing necessary permits, drying the material, haul roads, clearing, grubbing, excavating the pits, placing, compaction, and restoration of pits and haul roads to a condition satisfactory to property owners, and in compliance with applicable federal, state, and local laws and regulations.

2.02 SOURCE QUALITY CONTROL

A. If tests indicate materials do not meet specified requirements, change material and retest.

B. Provide materials of each type from same source throughout the Work.

PART 3 – EXECUTION

3.01 TOPSOIL

A. Contractor shall strip topsoil and stockpile on site at a location determined by the Owner at the Contractor's expense.

B. Topsoil shall be placed to a depth of four inches over all disturbed or proposed landscaped areas.

C. Topsoil shall be provided at Contractor's expense if it is not available from site.

D. Any remaining topsoil will be hauled off site at the Contractors expense.

E. Do not excavate wet topsoil.

3.02 EXCAVATION

A. Suitable excavation material shall be transported to and placed in fill areas within limits of the work.

B. Unsuitable material encountered in areas to be paved and under building pads, shall be excavated two feet below final grade and replaced with suitable material from site or borrow excavations. Contractor shall notify Engineer if more than two feet of excavation is needed to replace unsuitable material.

C. Unsuitable and surplus excavation material not required for fill shall be disposed of off site.

D. Proper drainage, including sediment and erosion control, shall be maintained at all times. Methods shall be in accordance with the National Pollutant Discharge Elimination System standards and other local, state, and federal regulations.

E. Unsuitable materials as stated herein are defined as highly plastic clay soils, of the CH and MH designation, border line soils of the SC–CH description, and organic soils of the OL and OH description based on the Unified Soils Classification System. Further, any soils for the top two feet of pavement subbase shall have no more than 15 percent passing the # 200 sieve.

3.03 GROUND SURFACE PREPARATION FOR FILL

A. All vegetation, roots, brush, heavy sods, heavy growth of grass, decayed vegetable matter, rubbish, and other unsuitable material within the areas to be filled shall be stripped and removed prior to beginning the fill operation.

B. Sloped ground surfaces steeper than one vertical to four horizontal, on which fill is to be placed shall be plowed, stepped, or benched, or broken up as directed, in such a manner where fill material will bond with the existing surface.

C. Surfaces on which fill is to be placed and compacted shall be wetted or dried as may be required to obtain the specified compaction.

3.04 FILL

A. Shall be placed in successive horizontal layers eight inches to ten inches in loose depth for the full width of the cross–section and compacted as required.

3.05 FINISHED GRADING

A. All areas covered by the project including excavated and filled sections and adjacent transition areas shall be smooth graded and free from irregular surface changes.

B. Degree of finish shall be that ordinarily obtainable from either blade–grader or scraper operations, supplemented with hand raking and finishing, except as otherwise specified.

C. Unpaved areas to within 0.1 feet of elevations shown on the drawings provided such deviation does not create low spots that do not drain.

D. Paved Areas – Subgrade to within 0.05 feet of the drawing elevations less the compacted thickness of the base and paving.

E. Building Pads – Subgrade to within 0.05 feet of the drawing elevations [less the thickness of the concrete slab].

F. Ditches and lagoon banks shall be finished graded, dressed, and seeded within fourteen calendar days of work to reduce erosion and permit adequate drainage.

3.06 DISPOSAL OF WASTE MATERIAL

A. All vegetation, roots, brush, sod, broken pavements, curb and gutter, rubbish, and other unsuitable or surplus material stripped or removed from limits of construction shall be disposed of by the Contractor.

3.07 PROTECTION

A. Graded areas shall be protected from traffic, erosion, settlement, or any washing away occurring from any cause prior to acceptance.

B. Contractor shall be responsible for protection of below grade utilities shown on the drawings or indicated by the Owner at all times during earthwork operations.

C. Repair or re–establishment of graded areas prior to final acceptance shall be at the Contractors expense.

D. Site drainage shall be provided and maintained by Contractor during construction until final acceptance of the project. Drainage may be by supplemental ditching, or pumping if necessary, prior to completion of permanent site drainage.

3.08 DRAINAGE

A. Contractor shall be responsible for providing surface drainage away from all construction areas. This shall include maintenance of any existing ditches or those constructed in the immediate vicinity of the work. Contractor shall provide proper and effective measures to prevent siltation of wetlands, streams, and ditches on both the Owner's property, and those properties downstream.

3.09 FIELD QUALITY CONTROL

A. Compaction testing shall be performed in accordance with ASTM D 6938. Where tests indicate the backfill does not meet specified requirements, the backfill shall be reworked or removed and replaced, and then retested at the Contractor's expense.

B. Unpaved areas – at least 90 percent of maximum laboratory density within two percent optimum moisture content unless otherwise approved by the Engineer.

C. Paved Areas and Under Structures – top six inches layer of subbase to at least 98 percent of maximum laboratory density within two percent optimum moisture content. Layers below top 6 inches shall be compacted to 95 percent of maximum laboratory density within two percent optimum moisture content.

D. Rolling and compaction equipment and methods shall be subject to acceptance by the Engineer. Acceptance in no way relieves Contractor of the responsibility to perform in correct and timely means.

E. Number of Tests – Under paved areas, no less than one density test per horizontal layer per 5,000 square feet of subbase shall be made. In unpaved areas, no less than one density test per horizontal layer per 10,000 square feet of fill area shall be made. [On building pads, no less than one density test per horizontal layer per 1,500 square feet of fill area shall be made.]

3.10 PROOF ROLLING

A. Shall be required on the subbase of all concrete and paved areas and on the base of all paved areas where designated by the Engineer. Proof rolling shall take place after all underground utilities are installed and backfilled. The operation shall consist of rolling the subbase or base with a fully loaded ten–wheeled dump truck. A full load shall consist of ten to twelve cubic yards of soil or rock. The dump truck shall be capable of traveling at a speed of two to five miles per hour and be in sound mechanical shape with no exhaust leaks or smoking from burning oil. The Engineer shall determine number of passes and areas rolled.

END OF SECTION

INDEX TO

SECTION 31 10 00 – SITE CLEARING

SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Removal of surface debris.

B. Removal of paving, curbs, and concrete, etc.

C. Removal of trees, shrubs, and other plant life.

D. Topsoil excavation.

1.02 RELATED SECTIONS

A. Section 01 56 39 – Temporary Tree and Plant Protection.

B. Section 02 41 13 – Selective Site Demolition.

C. Section 31 00 00 - Earthwork.

1.03 REGULATORY REQUIREMENTS

A. Conform to applicable codes for environmental requirements and the City of Savannah ordinances.

B. Coordinate clearing Work with utility companies.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide tree protection materials as detailed on the construction drawings. Provide protection of existing structures during site clearing operations.

PART 3 - EXECUTION

3.01 PREPARATION

A. Verify that existing plant life designated to remain is clearly identified and protected.

B. Contractor shall coordinate with Owner to identify a salvage area for placing removed materials.

3.02 PROTECTION

A. Protect all trees on site that are not identified in the Construction Drawings for removal. Refer to Section 01 56 39 Temporary Tree and Plant Protection for additional requirements regarding protection of trees.

B. Protect bench marks, survey control points, and existing structures from damage or displacement.

C. Protect all existing utilities unless noted otherwise.

D. Clearing operations shall be conducted so as to prevent damage from falling trees to trees left standing, to existing structures and installations, and to those under construction, and so as to provide for the safety of employees and others.

3.03 CLEARING

A. Clear areas required for access to site and execution of work. Clearing shall consist of felling and cutting trees into sections, and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within area to be cleared. Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be removed completely from the site, except such trees and vegetation as may be indicated or directed to be left standing. Trees designated to be left standing within cleared areas shall be trimmed of dead branches 1-1/2 inch or more in diameter. Limbs and branches to be trimmed shall be neatly cut close to the trunk of the tree or main branches. Cuts more than 1-1/2 inches in diameter shall be painted with accepted tree wound paint. Trees and vegetation to be left standing shall be protected from damage incident to clearing, grubbing, and construction operations, by the erection of timber barriers or by such other means as circumstances require. Such barriers must be placed and be checked by the Owner before construction observations can proceed (See paragraph 3.2). Clearing shall also include removal and disposal of structures obtruding, encroaching upon, or otherwise obstructing the work.

3.04 GRUBBING

A. Grubbing shall consist of the removal and disposal of stumps, roots larger than one inch in diameter, and matted roots from the designated grubbing areas. This material, together with logs and other organic or metallic debris not suitable for building of pavement subgrade or building pads, shall be excavated and removed to a depth of not less than 18-inches below the original surface level of the ground in embankment areas and not less than two feet below the finished earth surface in excavated areas. Depressions made by grubbing shall be filled with well-compacted controlled fill, as defined in Section 31 23 13 Subgrade Preparation.

3.05 REMOVAL

A. Additional Removals: Where indicated or directed, trees and stumps shall be removed from areas outside those areas designated for clearing and grubbing. The work shall include the felling of such trees and the removal of their stumps and roots. Trees shall be disposed of as hereinafter specified. Remove debris,

rock, and other extracted plant life from site. Partially remove paving, curbs, and concrete, as indicated. Neatly saw cut edges at right angle to surface.

B. Following all clearing, grubbing and removal, any resulting voids created shall be backfilled with well-compacted controlled fill, as defined in Section 31 23 13 Subgrade Preparation. The existing fill soils may remain in place if they are deemed sufficiently stable by the Geotechnical Engineer at the time of Construction.

3.06 DISPOSAL

A. Disposal of trees, branches, snags, brush, stumps, etc., resulting from the clearing and grubbing shall be removed from the site and is the responsibility of the Contractor. All costs in connection with disposing of the material shall be borne by the Contractor. All liability associated with the disposal of the cleared and grubbed material shall be the responsibility of the Contractor. The disposal of all materials cleared and grubbed shall be in accordance with the state and local regulations.

3.07 GEOTECHNICAL RECOMMENDATIONS

A. All site clearing activity shall be in conformance with the Geotechnical Recommendations provided by Terracon for this project.

3.08 COUNTY REQUIREMENTS

A. Adhere to all County requirements.

END OF SECTION

INDEX TO

SECTION 31 23 13 – SUBGRADE PREPARATION

SECTION 31 23 13

SUBGRADE PREPARATION

PART 1 – GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM): D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m1m3)).

B. Georgia Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition (GADOT Standard Specifications).

1.02 DEFINITIONS

A. Optimum Moisture Content: As defined in Section 31 23 23, Fill and Backfill.

B. Prepared Ground Surface: Ground surface after completion of clearing and grubbing, scalping of sod, stripping of topsoil, excavation to grade, and scarification and compaction of subgrade.

C. Relative Compaction: As defined in Section 31 23 23, Fill and Backfill.

D. Subgrade: Layer of existing soil after completion of clearing, grubbing, and scalping of topsoil, prior to placement of fill, roadway structure, or base for floor slab.

E. Proof-Rolling: Testing of subgrade by compaction methods to identify areas that will not support the future loading without intolerable settlement.

1.03 SEQUENCING AND SCHEDULING

A. Complete applicable Work specified in Sections 31 10 00 Site Clearing and Section 31 23 16 Excavation, prior to subgrade preparation.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

3.01 GENERAL

A. Keep subgrade free of water, debris, and foreign matter during compaction or proof-rolling.

B. Bring subgrade to proper grade and cross-section and uniformly compact surface.

C. Do not use sections of prepared ground surface as haul roads. Protect prepared subgrade from traffic.

D. Maintain prepared ground surface in finished condition until next course is placed.

3.02 COMPACTION

A. Under and Adjacent to Structures, Slabs, Pavements, Footings and Sidewalks: The area under and ten feet beyond the footprint of proposed facilities shall be proof-rolled after removal of topsoil and before placement of fill. Proof-roll shall be with a minimum of ten overlapping passes using a fifteen ton or heavier vibratory roller. The upper twelve inches of the bottom shall be compacted to at least 95 percent of the modified Proctor maximum dry density, as determined by ASTM D1557. Any soft areas that cannot be compacted shall be over-excavated and replaced with compacted sand, silty sand, or other material, as determined by the Geotechnical Engineer. Subgrade compaction under pavement areas shall be in accordance with the GADOT standard specifications.

B. All compacted subgrade in footprint of new structures shall be inspected by Geotechnical Engineer and accepted prior to placing fill or other material.

C. Under Earthfill: Compact upper twelve inches to a minimum of 95 percent of the modified Proctor maximum dry density, as determined in accordance with ASTM D1557.

3.03 MOISTURE CONDITIONING

A. Dry Sub grade: Add water, then mix to make moisture content uniform throughout.

B. Wet Subgrade: Aerate material by blading, harrowing, or other methods, to hasten drying process.

3.04 TESTING

A. Testing methods and frequencies shall be per Section 31 23 23 "Fill & Backfill" , 1.04 Quality Assurance.

3.05 CORRECTION

A. Soft or Loose Sub grade:

1. Adjust moisture content and re-compact; or

2. Over excavate as specified in Section 31 23 16, Excavation, and replace with suitable material from the excavation, as specified in Section 31 23 23, Fill and Backfill.

B. Unsuitable Material: Over excavate as specified in Section 31 23 16 Excavation, and replace with suitable material from the excavation, as specified in Section 31 23 23 Fill and Backfill.

END OF SECTION

INDEX TO

SECTION 31 23 16 – EXCAVATION

SECTION 31 23 16

EXCAVATION

PART 1 – GENERAL

1.01 DEFINITIONS

A. Common Excavation: Removal of material not classified as rock excavation.

1.02 QUALITY ASSURANCE

A. Provide adequate survey control to avoid unauthorized over-excavation.

B. Excavation Support: When performing trench excavation in excess of five feet in depth, comply with Occupational Safety and Health Administration's (OSHA) trench safety standards, 29 CFR, s. 1926.650, Subpart P, and all subsequent revisions or updates adopted by the Department of Labor and Employment Security. Ensure that trench boxes are wide enough to accommodate compaction and density testing. The excavation support system shall be designed by a professional Engineer registered in the State of South Carolina.

1.03 WEATHER LIMITATIONS

A. Material excavated during inclement weather shall not be used as fill or backfill until after material drains and dries sufficiently for proper compaction. If this occurs, Geotechnical Engineer shall approve material prior to use.

1.04 SEQUENCING AND SCHEDULING

A. Clearing, Grubbing, and Stripping: Complete applicable Work specified in Section 31 10 00 Site Clearing, prior to excavating.

B. Dewatering: Conform to applicable requirements of Section 31 23 19.01 Dewatering, prior to initiating excavation.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

3.01 GENERAL

A. Excavate to lines, grades, and dimensions shown and as necessary to accomplish Work. Excavate to within tolerance of plus or minus 0.1 foot, except where dimensions or grades are shown or specified as maximum or minimum. Allow for

forms, working space, granular base, topsoil, and similar items, wherever applicable. Trim to neat lines where concrete is to be deposited against earth.

B. An unbraced temporary excavation with side slope inclined at one and a half Hertz to 1 Volt or flatter is expected to remain stable if not subject to surcharge load or vibration. Excavation deeper than five feet shall comply with OSHA trench safety standards, 29 CFR, s. 1926.650,

C. Surface water runoff should be prevented from entering trenches by temporary berms, swales, or other diversion methods.

D. Do not over–excavate without written authorization of Engineer.

E. Maintain subsurface with a minimum of twelve inches below excavations.

3.02 UNCLASSIFIED EXCAVATION

A. Excavation is unclassified. Complete all excavation regardless of the type, nature, or condition of the materials encountered.

3.03 EXCAVATION AROUND PILES

A. Excavation of areas where piles are to be installed shall be performed with acceptable equipment to six to twelve inches above the base of the footing or pile cap. This will occur prior to installation of piles.

B. Following installation of piles, excavation of remaining area around and between piles shall be performed by hand and shall not damage or dislocate piles.

3.04 TRENCH WIDTH

A. Minimum Width of Trenches: Excavate trenches for pipes to the elevation of the bottom of the pipe or sub-base as specified on the Drawings. The width should be sufficient to provide adequate working room for pipe installation and connections.

3.05 EMBANKMENT AND CUT SLOPES

A. Shape, trim, and finish cut slopes to conform to lines, grades, and cross-sections shown, with proper allowance for topsoil or slope protection, where shown.

B. Remove stones and rock that exceed three-inch diameter and that are loose and may roll down slope. Remove exposed roots from cut slopes.

C. Round tops of cut slopes in soil to not less than a six-foot radius, provided such rounding does not extend offsite or outside easements and rights-of-way, or adversely impacts existing facilities, adjacent property, or completed Work.

3.06 STOCKPILING EXCAVATED MATERIAL

A. Stockpile excavated material that is suitable for use as fill or backfill until material is needed.

B. Confine stockpiles to within easements, rights-of-way, and approved work areas. Do not obstruct roads or streets.

C. Do not stockpile excavated material adjacent to trenches and other excavations, unless excavation side slopes and excavation support systems are designed, constructed, and maintained for stockpile loads.

D. Do not stockpile excavated materials near or over existing facilities, adjacent property, or completed Work, if weight of stockpiled material could induce excessive settlement.

3.07 DISPOSAL OF SPOIL

A. Dispose of excavated materials, which are unsuitable or exceed quantity needed for fill or backfill, offsite.

B. Dispose of debris resulting from removal of organic matter, trash, refuse, and junk as specified in Section 31 10 00, Site Clearing, for clearing and grubbing debris.

END OF SECTION

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SECTION 31 23 19 – SLUDGE DE-WATERING SYSTEM

SECTION 31 23 19

SLUDGE DE-WATERING SYSTEM

1.0 WORK INCLUDED

1.1 The contractor shall install one (1) Klampress 2.0-meter Type B5 belt filter press (furnished by owner) complete with sludge conditioning unit, hydraulic power unit, belt wash water booster pump, and one PLC/HMI touchscreen panel (furnished by owner). In addition, the contractor shall furnish and install dry sludge feed pump, raw polymer tank and pump, neat polymer tank and pump, and all necessary valves, inter-connecting piping and wiring, instrumentation, anchor bolts and other necessary appurtenances as shown on plans and the manufacturer installation manual for a complete and operating installation.

2.0 GENERAL

2.1 A belt press and belt press control cabinet will be provided by the City and installed by the general contractor.

2.3 All other wiring, controls, starters, disconnects, shall be the responsibility of the installing Contractor.

3.0 PERFORMANCE REQUIREMENTS

3.1 Each belt filter press shall be capable of operating satisfactorily under the following performance conditions:

3.2 Type of sludge: WAS from Aerobic Digester process.

3.3 Sludge feed concentration: Range 4 % dry solids.

3.4 Hydraulic throughput, solids throughput, cake solids concentration, solids capture (combined filtrate and washwater) and polymer use requirements:

Feed Solids %	Hydraulic Throughput GPM	Solids Throughput Lbs DS/hr	Cake Solids %	Solids Capture %	Polymer Use, Lbs Active Polymer/ Ton DS
4	200	1000	18	95	8

4.0 GENERAL SYSTEM REQUIREMENTS

4.1 After proper flocculation of the sludge with polymer, initial dewatering shall occur by gravity drainage through a relatively porous gravity section filter belt traveling

horizontally along the press. Further dewatering shall occur by squeezing the sludge between two tensioned pressure belts of heavier construction, first through a wedge zone then over and under a minimum of eight rollers forcing entrained water from the sludge through both pressure and shear action. Dry cake discharge shall be assisted by blades at each pressure belt. Each belt shall be subsequently washed with high pressure, low volume water from spray headers before it returns to the head of its section of the press. Wash water and filtrate shall be collected in drain pans for direction to a curbed concrete drainage basin surrounding the press.

4.2 The overall dimensions of each fully assembled belt filter press shall be as shown on the plans.

4.3 The equipment furnished shall be designed and constructed in accordance with the best practices and methods and for continuous service at maximum conditions. All parts shall be so designed and proportioned as to have liberal strength, stability and stiffness and to be fully suitable for the intended conditions of service. Provisions shall be made for easy lubrication, adjustment or replacement of all parts. Corresponding parts of multiple units shall be interchangeable. All materials used shall be of the best quality and fully suitable in every respect for the service intended. Unless otherwise specified, all materials in direct contact with sludge, polymer or filtrate shall be type 316 stainless steel or plastic. All fasteners shall be type 316 stainless steel.

5.0 SLUDGE CONDITIONING SYSTEM

5.1 Each sludge conditioning system shall consist of an in-line polymer injection ring, a variable orifice venturi type mixing valve and a press mounted flooded bottom distribution system for final flocculation as well as even distribution of sludge across the full width of the press.

5.2 The polymer injection ring shall be of the multiport type to assure optimum polymer usage, shall be of polyethylene construction and shall be supplied with a polyethylene injection manifold complete with tubing and fittings for distributing polymer to the injection points on the ring. The mixing valve shall be of cast type 316 stainless steel construction and shall include provisions to vary the throat area through an external adjustably weighted lever arm for most effective instantaneous polymer/sludge mixing. The mixing valve shall also include a removable inspection cover.

5.3 Each injection ring and mixing valve shall form a sludge/polymer mixing assembly which shall be located directly in the sludge feed line. The contractor shall provide spool pieces to simulate the mixing assembly at two additional locations in each sludge feed line to allow for repositioning the mixing assembly for most effective floc formation. The contractor shall also provide the necessary polymer piping and valving to accommodate the alternate mixing assembly locations.

5.4 The flooded bottom distribution system shall be mounted on the feed end of the press and shall be sized to provide an adequate residence time for effective floc formation. The distribution system shall consist of a lower inlet section or feed hopper and an upper distribution and exit section. All parts of the system shall be constructed of type 316 stainless steel. Sludge shall directly overflow the hopper

onto the full width of the distribution section. The sludge inlet line to the tank shall incorporate a means of draining the feed hopper. The hopper shall also be provided with a plugged drain connection. No mechanical or static mixing devices shall be included in the hopper or distributor as such devices become fouled and require frequent cleaning.

6.0 MISCELLANEOUS

6.1 Each press shall be provided with two yellow safety trip cords at each side of the press, one at a lower elevation and one at a higher elevation. Each cord shall be connected to a NEMA 4X lever operated emergency stop switch which shall immediately stop the belt drives and shut down the entire system upon actuation of the switch. These switches shall be independent of the gross belt misalignment switches and shall require resetting at the press before the equipment can be restarted.

6.2 Each press shall be complete with all intra-unit power and control wiring terminating in a single press mounted NEMA 4X stainless steel junction box. All wiring shall be run in PVC coated rigid conduit for added corrosion resistance.

6.3 Each press shall be complete with all intra-unit hydraulic system and washwater piping as well as all filtrate and washwater drain lines directed to the collection basin beneath the press, all washwater supply piping terminating at a single washwater inlet connection and all hydraulic piping and tubing.

6.4 For maximum corrosion resistance all miscellaneous parts such as brackets, spacers, etc. shall be fabricated from type 304 stainless steel or plastic and all guards shall be fabricated from type 304 stainless steel.

6.5 **The Contractor Shall provide a washwater booster pump** for the belt press unit to raise the system water pressure to the required operating level. The pump shall be a horizontal end suction centrifugal pump in type 316L stainless steel construction with mechanical shaft sealing. The pump shall be driven by a direct coupled **7-1/2 HP**, 3600 RPM, TEFC motor and shall be furnished with a common steel channel base for the motor and pump and a coupling guard.

7.0 BELT PRES CONTROL PANEL (Provided by City)

7.1 A control panel shall be furnished by the City for the belt filter press to control the belt press functions and those of the related auxiliary equipment specified herein. The panel shall be preassembled and prewired and shall include all controls necessary for semi-automatic system operation with provisions for manual control of individual items when desired. The panel shall be suitably wired for connection to a 480-volt, 3 phase, 60 Hertz power sources.

7.2 The enclosure shall be fabricated from 14-gauge type 304 stainless steel, shall be floor stand mounted and shall be constructed to NEMA 4X standards. Instruments and control devices mounted on the enclosure door shall be rated for or installed in such a manner as to maintain the NEMA 4X integrity. Nameplates shall be engraved laminated phenolic with black background and white letters to identify

each component mounted on the panel face. Letter height shall not be less than 3/16 inch. Additionally, the complete panel, as an assembly, shall be built in accordance with UL 508 and shall have a UL serialized label.

7.3 Wiring shall be accomplished in a neat workmanlike manner and run in PVC wiring duct where practical. Where not practical it shall be supported and tied in position with nylon cable ties. All wiring shall be identified with a number code and all wiring for external connection shall be brought to a numbered terminal strip. Wiring shall comply with the applicable requirements of the latest edition of the National Electrical Code. Interconnecting wiring between this panel and the press and other related equipment shall be the responsibility of the contractor.

7.4 The enclosure shall house a flange mounted dead front main disconnect, all motor starters, variable frequency controls, a programmable logic controller, interlocks, alarms, indicating lights and operator controls required for the operation of the belt filter press and auxiliary equipment described in this specification section. Each AC motor, contactor and wiring shall be protected by a properly sized motor starter protector and overload relays. Variable frequency drives shall be protected by properly sized fuses. Indicating lights and operator controls only as required shall be included in this panel for other system auxiliary equipment items described in other sections of the specifications. Starters, variable speed drives, controllers, etc. for such other items shall be furnished by the contractor and shall be located elsewhere. The following control interfaces shall be provided for this auxiliary equipment: (including sludge feed pump, dry sludge cake pump, polymer feed pump, and the wash water booster pump) dry contacts rated at 10A 125V for start/stop control, PLC inputs to accept dry contact 'on' status and motor overload/fail signals, 4-20 madc signals or high/low speed switch contact closures as required for speed command signals. System interlocking, and logic shall be provided by an industrial grade programmable logic controller meeting the following minimum requirements:

1. Total input/output: As required, expandable to 184 flexible I/O.
2. Memory size and type (16-bit words): 3.7K words EEPROM.
3. Scan rate: 0.87 ms for 1K words.
4. Internal functions: 196 internal coils, 192 data registers, 64 timers/counters and RS232C port.
5. Program language: Boolean based relay logic.
6. Programming: Hand held programmer, plant CPU or PC interface.
7. Acceptable PLC: Allen Bradly, DL305 by PLC Direct or equal.

Components shall be selected, and the enclosure sized to limit the enclosure internal heat rise to 10° C while operating in a 40°C ambient. Calculations or method of determining compliance shall be submitted to the Engineer with the initial drawing submittal. A minimum of 20% spare terminal blocks shall be provided. The control panel shall be completely tested under simulated field conditions by the press manufacturer prior to shipment. The Operation and Maintenance Manual shall contain complete as-built drawings including schematics, physical layout and terminal connections. It shall also contain tabulated maintenance procedures.

7.5 The control panel face shall include the following controls and indicators. All start/stop controls shall be of the illuminated pull-to-start push-to-stop type with status lights indicating steady on for run and flashing for fail or overtemperature.

1. Main disconnect switch.
2. System automatic cycle start/stop control with on status light.
3. Hydraulic power unit start/stop control with on status/motor fail light.
4. Belt washwater booster pump start/stop control with on status/motor fail light and/or washwater solenoid valve to open/close appropriately.
5. Gravity belt drive start/stop control with on status/motor overtemperature light, speed control potentiometer and speed indicator.
6. Pressure belt drive start/stop control with on status/motor overtemperature light, speed control potentiometer and speed indicator.
7. Sludge feed pump start/stop control with on status/motor fail light, speed control and speed indicator as required.
8. Polymer feed pump start/stop control with on status/motor fail light, speed control and speed indicator as required.
9. Sludge cake pump start/stop control with on status/motor fail light.
10. Start/stop controls with on status/motor fail lights for raw polymer mixing pump.
11. Belt prewet and post wash cycle indicator lights.
12. Motor run/jog selector switch.
13. Emergency stop pushbutton with alarm/emergency trip light.
14. Gravity belt gross misalignment alarm light.
15. Pressure belt gross misalignment alarm light.
16. Gravity belt broken belt/belt drive fail alarm light.
17. Pressure belt broken belt/belt drive fail alarm light.
18. Low system hydraulic pressure alarm light.
19. Low system washwater pressure alarm light.
20. Alarm lights as required for other specified alarm conditions.
21. Audible alarm horn.
22. Alarm acknowledges pushbutton.
23. Alarm reset/lamp test pushbutton.
24. Sludge Pump Control Switch – HOA.

7.6 Semi-automatic operation of the entire system shall be controlled by a single start/stop cycle control. This control along with status and alarm contacts shall provide inputs to the programmable controller (PLC). The controller shall continuously scan the inputs and according to a logic program stored in its memory shall develop the appropriate run, stop, status or alarm signals for devices connected to its output. The PLC shall cause specific functions to be interlocked, timed, started or stopped as required during the start up, run and shutdown modes of operation. These modes of operation may be operator initiated or caused by one of the inputs. Essentially, the PLC shall initiate and monitor each step of the cycle, check that all interlocks are satisfied and drive start-ups are confirmed before proceeding to the next step, provide for prewetting the belts before sludge is introduced to the press on start-up and provide for the proper timed intervals for complete discharge of sludge cake and thorough belt washdown during the shutdown cycle. The control system shall allow unattended operation in the semi-automatic mode. In the manual mode of operation, the system shall be started and stopped by the actuation of each individual component control.

7.7 During operation in either mode, any of the following alarm conditions shall activate the alarm horn and respective alarm light or motor status indicator light causing the entire system to shut down either instantaneously or in the normal programmed

sequence as appropriate: gross misalignment of any belt, low system hydraulic pressure, low washwater pressure, emergency stop at the press, either belt drive fails, any broken belt, either belt drive motor overheats, auxiliary DC motors overheated, auxiliary AC motors overloaded or emergency stop at the control panel. Alarm annunciation shall follow ISA sequence AM. The motor status light shall serve as the alarm light, flashing for motor fault conditions or, in the case of remotely located starters, for overload trip or power off. If the operator can correct an alarm condition during programmed shutdown, the PLC shall allow continuation of full operation by reactivation of the cycle control.

7.8 For either semi-automatic system operation where the programmable logic controller assumes control or manual control where an operator assumes control, the sequence of operation shall be as follows:

1. **Start-up Sequence:**
   a) Start the hydraulic power unit.
   b) Start the belt washwater booster pump and/or open the washwater solenoid valve.
   c) Start the gravity belt drive.
   d) Start the pressure belt drive.
   e) Start the sludge cake pump (conveyor) after receiving signals from the sludge level sensor.
   f) After allowing the belts to become wet, start the polymer feed pump and the sludge feed pump.
   g) Start any other auxiliary equipment item at the appropriate time during the sequence (in-line sludge grinder).
   h) Adjust belt speed and/or sludge and polymer feed rates.

2. **Shutdown Sequence:**
   a) Stop the sludge and polymer pumps.
   b) After allowing sludge to discharge completely from the belts and allowing for complete belt washdown, stop the washwater booster pump and/or close the solenoid valve.
   c) Stop the belt drives.
   d) Stop the hydraulic power unit.
   e) Stop the conveyor.
   f) Stop any other auxiliary equipment at the appropriate time during the sequence.

8.0 WARRANTY

8.1 The equipment provided by the General Contractor shall be guaranteed against defects in material and workmanship under normal use and service for a period of one year after start-up not to exceed eighteen months after shipment during which time repairs or replacements shall be made without charge.

9.0 MANUFACTURER'S SUPERVISORY SERVICES

9.1 The belt press manufacturer shall furnish the services of a competent and experienced person for a period of 10 days to be covered in 2 trips to job site to check the installation, supervise the start-up, supervise the performance testing and

provide operator instruction for the equipment furnished. Additional service, if requested, shall be available at the manufacturer's portal to portal per diem rate in effect at the time of service delivery, plus all travel and living expenses.

10.0 LIQUID POLYMER ACTIVATION / DILUTION / FEED SYSTEM

10.1 GENERAL

Polymer Unit

The polymer dilution/feed unit shall be capable of automatically metering, diluting, activating and feeding a liquid polymer with water.

10.2 WARRANTY

The system shall be covered by a two (2) year limited warranty against defects in materials and workmanship. The mixing chamber shall be covered by a lifetime warranty covering the repair and replacement of any part of the mixing chamber that fails for any reason, provided unit has received reasonable use and care. The mixing chamber shall be guaranteed not to plug for the life of the system. The warranty shall not be de-rated as a result of using non-potable water.

If purchaser is dissatisfied with unit's performance within 30 days of start-up, unit may be returned for full refund, or credit against another unit, provided unit has received reasonable use and care.

10.3 EQUIPMENT

A. Multi-Zone Mixing Chamber

A non-mechanical hydrodynamic blending device specifically designed to dilute and activate emulsion, dispersion and solution type polymer with viscosities up to 75,000 cps. and active contents up to 75%, shall be provided. Systems without a proven track record with all types of polymers described above will not be considered.

The liquid polymer activation chamber's mixing energy shall be staged such that it provides for high, non-damaging mixing energy over the full operating range of the system which then dissipates through concentric chambers. The integral water control device, which shall also produce mixing energy by creating a pressure drop across its orifice, shall be constructed of stainless steel and brass and shall be designed to allow orifice replacement without disassembly of any other part of the system. The system shall be designed for use with either potable or non-potable dilution water.

A mixing chamber drain valve with 1/2" fitting shall be provided. The mixing chamber shall have a maximum rated pressure of 150 psi.

Provide a brass, adjustable range pressure relief valve on mixing chamber with a range of 25 to 75 psi.

At no time shall polymer be exposed to excessive shear. All components that require periodic maintenance shall be readily accessible.

Provide a neat polymer check valve specifically designed to isolate neat polymer from dilution water. The valve shall be designed with an open, unobstructed path to the valve seat. The valve body shall be constructed of Teflon. The ball shall be stainless steel. The spring shall be covered with a PVC boot, to prevent polymer from passing through the spring. The valve shall be readily accessible for cleaning and shall be easily disassembled. Conventional check valves, and or check valves that are installed inside the mixing chamber, or which require mixing chamber disassembly for servicing will not be accepted.

B. Dilution Water Control

The dilution water flow rate shall be monitored by a Rotameter type flow meter Unions shall be provided on the inlet and outlet of the Rotameter to allow easy removal for cleaning.

Unit shall have an electric solenoid valve for on/off control of total dilution water flow.

C. Open Top Polymer Tank:

1. One (1) Polyprocessing 700 Gallon 1.9SG XLPE Natural Open Top Vertical Cylindrical Tank with Three (3) 1" 150# Flanged Connections

D. Pump

Unit shall have a neat polymer metering pump with the following;

1-	Fluid	1.25 % polymer
2-	Viscosity	1000cPs
3-	Flow, Min/Max.	0.03 / 0.3 gpm
4-	Pressure	300 psi
5-	Drawdown Cylinder	500 ML

6- One (1) MOYNO Progressive Cavity metering pump

-	Model # B4100D-SSF-AAA	
-	Motor	1HP/230VAC/3 PH/60 Hz/1750
-	Pump housing:	S.S.
-	Internal material:	S.S. chrome plated
-	Stator material:	Viton
-	Seal:	Viton
-	Gearbox	NORD SK172/2.49:1 Ratio
	Drive	1 hp, 1 Ph 120VAC Input / AC Tech Drive Model No. ESV751N01SXE

E. Controls

A control panel integral to the systems frame shall be provided, rated NEMA 4X and constructed of FRP. The control panel shall consist of all

switches, relays, indicator lights, digital displays, as required. The control panel and all components shall be industrial duty. Switches and indicator lights shall be equal to Allen Bradley series 800E. "Mini" LED indicator lights, toggle switches and residential light switches shall not be acceptable as control devices or indicators. All skid mounted electrical components interconnected to control panel shall terminate on terminal block. Terminal blocks sized for 14 ga. wire with terminal block numbers and legend, as manufactured by Entrelec or equal. Wires shall be neatly run through wire race-way and numbered with adhesive type labels. Control Enclosure shall be Vynkier or equal.

Control Devices:

ON - OFF - REMOTE switch with contacts to receive remote start / stop signal (maintained contact) and provide "remote" mode output indication (dry contact)
Tactile membrane type stroke frequency control (located on the metering pump).

Indicators:

LCD display of pump rate
Power ON indicator

Inputs signals:

External mode shall allow for automatic polymer pump pacing based on a 4-20 mA analog input signal.
In the remote mode, the unit shall accept a run signal (maintained contact).

Outputs:

System in "Remote mode" status output, dry contact
System "Running" status output, dry contact

10.4 MAINTENANCE

A. Unit shall be open frame design to allow easy access to all components.

Mixing chamber shall be easily disassembled and reassembled to allow access to all parts exposed to neat polymer.

Polymer check valve shall be readily accessible. Check valves installed inside mixing chamber shall not be acceptable.

10.5 MATERIAL SPECIFICATIONS

A. The Polymer mixing pump shall have the following:

1. Dilution water inlet, 1" FNPT
2. Neat polymer inlet, 1.5" barbed hose fitting or sch. 80 PVC

3. Solution discharge, 1" FNPT

4. Required Utilities
   - Power Supply: 120VAC, 15A, 60Hz
   - Water Supply: 30 GPM @ 30 - 70 psi

5. Unit Electrical Components
   - 1 hp / 3 ph / 1800 RPM / 230-460V / 60 Hz / TEFC
   - 1 hp, 1 Ph 120VAC Input / 3 Ph 230V Output AC Tech Drive Model No. ESV751N01SXE
   - 0.5" vane type water flow meter with low flow set point
   - 10-foot power supply cord with male connector

- SS Base Connections - Electrical
  - Standard, grounded male plug - 120/1/60, 20 amps max.
  - Terminal blocks - 4-20 mA signal input
  - Terminal blocks - dry contact input for remote start
  - Terminal blocks - dry contact run output
  - Terminal blocks for interconnecting all skid mounted electrical devices
  - Isolators to isolate analog and discrete signals connected to terminal block.

- Dilution water plumbing shall be schedule 80 PVC. Hose shall be braided vinyl. Hose fittings shall be schedule 80 PVC. No nylon fittings shall be used.

  Mixing chamber – 304 stainless steel.

11.0 POLYMER MIX CONDITIONING TANK AND MIXER

2. One (1) Polyprocessing 1,050 Gallon 1.9SG XLPE Natural Dome Top Vertical Cylindrical Tank:
   - 5'-1" Diameter
   - 8'-6" Height
   - 19" Safe-Surge Manway Lid
   - One (1) "Suction" 1" flanged outlet 3" off bottom
   - One (1) "Fill" 1 ½" flanged as close to top as possible
   - One (1) "Overflow" 2" flanged, 1" lower than fill
   - One (1) "Low Level" 1" flanged, 6" from bottom
   - One (1) "Level" 1" flanged 3" from bottom

3. One (1) CHEMINEER Model 50DTC-1.5, Clamp-On Style Mixer with 316SS wetted parts and 1.5HP, 175RPM, Standard Duty, TEFC, 120/230V/1PH/60Hz Motor

4. The CHEMINEER Mixer will be mounted to a 304SS bracket that will be installed on/thru the raceways on the tank using 304SS hardware

5. One (1) NEMA 4X 304SS Mixer Start/Stop Panel Supplied Loose for Field Mounting/Wiring:

   - One (1) RITTAL NEMA 4X 304SS Electrical Enclosure 20" X 16" X 8" Model #WM201608N4
   - One (1) EATON 30 Amp Quick Disconnect Switch Model #R5A3030U
   - One (1) EATON Disconnect Switch Pistol Handle Model #SHR00N12
   - One (1) EATON Disconnect Switch 5MM Shaft Model #SF320SH5X5
   - One (1) EATON 1.5HP Manual Motor Starter with 120VAC Coils Model #XTSC025BCA
   - One (1) EATON 30mm 3-Position Corrosion Resistant Switches (CAM#3) Model #E34VHBL1
   - Two (2) EATON 30mm 2-"NO" Contact Blocks (Finger Safe) Model #10250T2P
   - One (1) EATON 30mm Corrosion Resistant Red LED Pilot Light 120VAC Model #E34FB197LRP2A
   - One (1) EATON 30mm Corrosion Resistant Green LED Pilot Light 120VAC Model #E34FB197LGP2A
   - One (1) EATON 30mm Corrosion Resistant Amber LED Pilot Light 120VAC Model #E34FB197LAP2A
   - TYTON-HELLERMAN Wire Track will be used to secure all wiring inside the cabinet
   - EATON 5.2MM Spring Cage Terminal Strip with well labeled terminals for all customer field connections
   - All necessary general wiring materials required such as wire tags, grounds, etc.
   - An as built electrical schematic sealed to prevent moisture damage will be included

Polymer Metering Pumps with Primary / Spare Control Panel:

Fluid:	1.25% Polymer solution
Viscosity:	1000cPs
Flow:	7gpm
Pressure:	50psi

6. One (1) MOYNO Compact C Progressive Cavity Metering Pumps:

   - Model #C23AS81RPA/E412
   - Pump Housing: Stainless Steel
   - Internal Material: Stainless Steel chrome plated
   - Stator Material: Viton
   - Seal: Packing
   - MOYNO Stator Temp Sensor with 115V Controller - Run Dry Protection

7. 1 (1) NORD Gear Reducers:

   - Model #SK172.1F-140TC

- Output Ratio: 2.92:1
- AGMA: Class II

8. 1 (1) BALDOR Inverter Duty Motors:

   - Power: 2HP
   - Speed: 1755 RPM
   - Voltage: 230/460 X 3Phase
   - Enclosure: TEFC
   - Insulation: F1

9. 1 (1) LENZE 2HP 400-480V (3PH) NEMA 4X Variable Frequency Drives Model #ESV152N04TMC

10. One (1) NEMA 4X 304SS Electrical Cabinet mounted on the frame and wired to the components to contain but is not limited to the following:

    - One (1) RITTAL NEMA 4X 304SS Electrical Enclosure 30" X 24" X 12" Model #WM302408N4
    - One (1) EATON 30 Amp Quick Disconnect Switch Model #R5A3030U
    - One (1) EATON Disconnect Switch Pistol Handle Model #SHR00N12
    - One (1) EATON Disconnect Switch 5MM Shaft Model #SF320SH5X5
    - One (1) EATON 3-Amp / 2-Phase Circuit Breaker Model #FAZ-C5/2-NA-SP
    - One (1) EATON 4-Amp / 1-Phase Circuit Breaker Model #FAZ-C7/1-NA-SP
    - One (1) EATON 200vA 460X120V CPT with Finger Safe Covers Model #C0200E2A
    - Two (2) EATON 30mm 3-Position Corrosion Resistant Switches (CAM#3) Model #E34VHBL1
    - Four (4) EATON 30mm 2-"NO" Contact Blocks (Finger Safe) Model #10250T2P
    - Two (2) EATON 30mm Corrosion Resistant Red LED Pilot Lights 120VAC Model #E34FB197LRP2A
    - Two (2) EATON 30mm Corrosion Resistant Green LED Pilot Lights 120VAC Model #E34FB197LGP2A
    - Two (2) EATON 30mm Corrosion Resistant Amber LED Pilot Light 120VAC Model #E34FB197LAP2A
    - TYTON-HELLERMAN Wire Track will be used to secure all wiring inside the cabinet
    - EATON 5.2MM Spring Cage Terminal Strip with well labeled terminals for all customer field connections
    - HUBBELL Flexible Conduit and Fittings to be used
    - All necessary general wiring materials required such as wire tags, grounds, etc.
    - An as built electrical schematic sealed to prevent moisture damage shall be provided

11. All components listed above to be mounted on a 304SS square tube frame with the Control Panel and VFD wired to motors.

12. Submittal Package shall include AutoDesk Inventor 3D Model in STP or STEP format of the entire packaged containers. Additional component drawings and electrical drawings/schematics shall be in 2D DWG or DXF format.

12.0 SLUDGE FEED PUMP TO BELT PRESS (Progressing Cavity Pump)

12.1 QUALITY ASSURANCE

A. The pump to be furnished under this Section shall be furnished by a single manufacturer who is fully experienced, reputable, and qualified in the manufacture of the equipment to be furnished. The manufacturer will be considered qualified upon examination of credentials and confirmation of satisfactory operation of similar installations over the past five years.

B. The progressing cavity pump to be furnished under this Section shall be as manufactured by Moyno, Model Z3AAC11RMB/E with Vulcan single mechanical seal, no substitutions.

C. Should equipment which differs from the Specifications be offered and determined to be equal to that specified, such equipment shall be acceptable only on the basis that any revisions in the layout and construction of the structures, piping and appurtenant equipment, electrical work, etc. required to accommodate such a substitution shall be made at no additional cost to the Owner and be as approved by the Engineer.

D. Pumps, drive units and motors shall be furnished by the pump manufacturer and be factory-mounted on a common base plate of cast iron or fabricated steel.

12.2 SYSTEM DESCRIPTION

A. Pumps shall be positive displacement, progressing cavity pumps. The liquid to be pumped is Municipal sludge with a concentration of 3-4 percent solids.

B. The pumps shall have a capacity as follows:

Tag No.	Max.,Capacity (gpm)	Total Dynamic Head (psig)	Max. Speed (rpm)	Min. Motor Size (HP)
*	250	30	302	20

C. Pump shall be interlock with the by belt press control panel.

12.3 MAINTENANCE

A. Tools and Spare Parts

1. One set of all special tools required for normal operation and maintenance shall be provided.

2. The following spare parts shall be provided as a minimum:

   a. One mechanical seal.

   b. One set of gaskets.

   c. One stator

12.4 MATERIALS AND EQUIPMENT

A. General

1. Stainless steel nameplates giving the name of the manufacturer, the rated capacity, head, speed and any other pertinent data shall be attached to each pump.

2. The manufacturer shall supply all motors. The manufacturer shall factory-mount motors, pumps, gear reduction units, couplings and guards on a common base plate.

3. The nameplate rating of the motors and drives shall not be exceeded, nor shall the motor design service factor be reduced when its pump is operating at any point on its characteristic curve.

4. These Specifications call attention to certain features, but do not purport to cover all details of construction of the units.

12.5 PUMPS

A. Pumps shall be heavy duty, positive displacement, progressing cavity type. The pump body shall be of thick-walled cast iron. Suction and discharge connections shall be 125 pound raised faced ANSI cast iron flanged. All wetted internal components shall be alloy steel unless otherwise stated in this specification.

B. The pump rotor shall be manufactured in **one piece** from an alloy steel conforming to BS970, grade 708M40T/709M40T (ASTM A 322, grade 4140/4145) or equivalent. The rotor surface should be coated with hard chrome plate to a nominal thickness of 0.25mm (.010") at the scroll peaks (major diameter). The surface should be polished to a minimum of Ra 1.6 um (63uin) to maximize stator wear life.

C. The rotor shall rotate relative to a one-piece, medium-high acrylonitrile Buna "N" rubber stator of approximate 70 Durometer hardness (Shore A) securely bonded to its steel tube housing. The stator shall be arranged to prevent the pumped material from contacting the bonding or the tube.

D. The rotor shall be joined to the drive shaft by a heavy duty, oil lubricated, pin type universal joint.

A **two-piece** design connecting rod is required which allows the rotor and stator to be removed without disturbing/dismantling the pump pin-joint drive connections.

E. The rotor and stator shall be capable of being removed and replaced without disturbing or removing the suction and delivery pipe work pump connections. This should also apply to the removal/replacement of the connecting rod, driveshaft and gland seal.

F. Suction chamber area should be easily and quickly accessible with unrestricted 360-degree access.

G. Unless otherwise specified or dictated by duty conditions, the gland seal shall consist of a single internally mounted bi-directional mechanical seal. Metallic parts should be manufactured from 316 stainless steel. Face materials should be Silicon Carbide.

12.6 MOTORS

A. Each pump's motor shall be a horizontal, totally enclosed fan-cooled, induction motor rated for 460VAC, constant speed, inverter duty, 1800 RPM and manufactured by WEG or approved equal.

12.7 GEAR REDUCTION UNIT

A. Gear reduction shall be oil-immersed helical or worm gears running on anti-friction bearings.

12.8 COUPLINGS

A. The pump shaft shall be connected with a close coupled flange mounted gear motor with cross drilled shaft.

12.9 BASE

A. Motor, drive and pump shall be mounted in-line, on a carbon steel brake bent base.

12.10 INSTRUMENTATION AND CONTROLS

A. The control of the progressive cavity pumps shall be accomplished locally through a NEMA 4X manufacturer supplied control panel.

B. The control mode of motor shall be made through the operation of a local selector switch.

C. The equipment manufacturer shall be responsible for sizing the NEMA 4X control panel. The pre-wired control panel shall house all control components. The control panel shall contain run, stop and power on indicator lights, standard start and stop pushbuttons and all miscellaneous appurtenances required for a complete and fully operational system.

12.11 SURFACE PREPARATION AND SHOP PRIME PAINTING

A. All surfaces shall be prepared, and shop primed as part of the work under this Section. Surface preparation and shop priming shall be as specified in the painting specifications.

12.12 INSTALLATION

A. Installation shall be in strict accordance with the manufacturer's instructions and recommendations in the locations shown on the Drawings. Installation shall include **contractor** furnished required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendations. Anchor bolts shall be set by the Contractor in accordance with the manufacturer's recommendations.

B. Base plate shall be grouted in place by Contractor using an approved non-shrink grout.

12.13 INSPECTION AND TESTING

A. Furnish the services of a factory representative for one (1) normal eight (8) hour day who has complete knowledge of proper operation and maintenance to inspect the final installation and supervise a test run of the equipment. These services may be combined with those provided under Paragraph 1.03.C.

B. After installation is complete and approved by the manufacturer's representative, contractor and engineer a completed start-up report shall be provided.

C. If the pump performance does not meet the Specifications, corrective measures shall be taken by the supplier.

D. Operation and Maintenance Manuals

Supplier shall provide five (5) hard copies and one PDF copy of the Operation and Maintenance Manuals. The manuals shall include equipment descriptions, operating instructions, drawings, troubleshooting techniques, a recommended maintenance schedule, and the recommended lubricants.

13.0 DRY SLUDGE CAKE TRANSFER PUMP

General Description:

13.1 The thickened sludge discharge pump shall be of the Moyno 2000 Ultra-Pro 1:2 design, Model 4H065G3M20CDA5AAA with stator Temperature Probe Kit. The pumps shall be of the heavy duty, positive displacement, progressing cavity type with a gear joint drive train. The drive train shall be firmly supported by heavy duty bearings integral to pump.

13.2 Standard suction housing shall be thick walled cast iron. Suction housing shall

incorporate two rectangular inspection ports, 180 deg. apart, to permit access to suction housing interior without disconnecting piping or feed chute. Bearing housing of pump shall be thick-walled cast iron. All cast parts shall be free of sand holes, blow holes and other defects.

13.3 Bearings must be integral to pump and of grease lubricated, tapered roller type with diverging pressure angles for maximum shaft stability. Close-coupled pumps, which do not utilize bearings integral to pump will not be accepted. Bearings are to be designed for minimum B-10 life of 100,000 hours under maximum operating conditions and will not require periodic lubrication. Bearings shall be protected from contaminants by means of bearing cover plate bolted to bearing housing. Bearings shall be enclosed in a separate housing, incorporating a bearing spacer and bolted bearing cover, which eliminates the need to shim bearings. Inferior methods of positioning bearing, i.e., snap rings, will not be accepted.

13.4 Discharge connection shall be a raised face, 8" 300 lb. ANSI Flange with bolt dimensions and spacing to ANSI standards. Suction opening shall be 16" wide x 88.88" long to mate with two (2) meter press.

13.5 Moyno Ultra-Shield rotor shall be of one-piece construction with integrally machined rotor head. Rotors made in long lengths and cut to size, with welded rotor heads, will not be accepted.

13.6 Moyno Ultra-Shield rotor shall be machined from alloy steel and shall be ASTM A331-90, grade 4150 cold finish with a yield strength greater than 55,000 psi. Moyno Ultra-Shield rotor shall be of single helix design with a Moyno Ultra-Shield 05 hard chrome plate thickness of .010 inches coating for maximum abrasion resistance.

13.7 Moyno Ultra-Flex stators shall be of double helix design and chemically bonded to inside of a carbon steel tube. Opening of stator, on suction side of pump, shall be beveled to at least a 30-degree angle from vertical. Beveled inlet is important to eliminate entrance losses due to flow of high solids sludges or viscous products.

13.8 Shore A durometer of Nitrile stator shall be 71 plus/minus 4. Stator shall be machined with groves to accept a 720-deg. retaining ring. Stator shall be rigidly fastened to suction housing and discharge flange with removable clamp rings to facilitate stator removal. Stators held in place with inferior methods, such as tie rods that are prone to uneven tensioning and stator misalignment, will not be accepted.

13.9 Stators for progressing cavity pumps shall be manufactured to size. Stators made in long lengths and cut to size will not be accepted.

13.10 Stator tensioning or adjusting devices, which distort rotor/stator compression and seal lines will not be accepted.

13.11 The replaceable stator gaskets shall be designed to prevent the material being pumped from contacting the stator bonding and tube. Stators manufactured with seals integrally molded to the stator elastomer, that are not replaceable and can be damaged during handling and installation, will not be accepted.

13.12 The Moyno Ultra-Drive shall also consist of gear joints of the grease lubricated, crowned gear type. The gear joint shall be totally enclosed and protected by a

wire reinforced elastomeric seal. Mechanical components of the gear joints shall be designed to operate for 10,000 hours at the manufacturer's published maximum speed and pressures.

13.13 The gear joints shall be machined of alloy steel, ASTM 331-90, grade A8620. The ball gear shall have an internal spline machined to American Standard 30 deg. pressure angle involute spline. Stub tooth gears must have a 30-degree pressure angle.

13.14 Joints utilized in the progressing cavity pump must have separate components handling the thrust forces and rotational forces. In the gear joint, the ball and ring gears handle rotational forces. The thrust plates handle thrust forces. Pin joints, on the other hand, are subjected to both rotational and thrust forces resulting in reduced wear life.

13.15 Light duty universal joint designs, such as flexishafts, cardan joints, and bushed pin joints, with forces concentrated on line contact will not be accepted.

13.16 The Moyno Ultra-Drive shall consist of a connecting rod that shall be of the rigid, splined design, connecting the gear joints of the drive shaft and eccentrically moving rotor. The connecting rod shall also serve as a conveyor assembly, moving the pumpage from the suction housing to the pumping elements.

13.17 The connecting rod shall be machined of alloy steel and shall be ASTM 331-90, grade A8620. The connecting rod shall be splined to accept a ball gear. All diameters of the connecting rod are to be concentric to within plus/minus .003" TIR. Total angularity of the connecting rod shall not exceed 1.5 deg.

13.18 The drive shaft shall be of two-piece construction through the bearings and shaft seal area. This design shall permit quick disassembly of the universal joints without affecting the alignment and setting of the pump bearings.

13.19 Carbon steel shafts shall be coated with Moyno Ultra-Shield hard chrome plating with a nominal chrome plate thickness of .010 inches for maximum abrasion resistance, to prevent scoring of shaft in packing area. Progressing cavity designs that do not protect drive shaft from abrasive wear with chrome plating will not be accepted.

13.20 Stuffing box shall be equipped with a split packing gland and split Teflon lantern ring to permit repacking of pump without removing bearings or drive shaft components. Fittings will be provided for grease lubrication of packing.

13.21 TYPE G3 Bridge Breaker:

A. Bridge breaker shall be an integral part of suction housing. It shall consist of two counter-rotating shafts, each with a series of wide paddles, and positioned in close proximity to pump's conveyor assembly. Bridge breaker shafts shall be sealed from pumped material by adjustable packing.

B. Bridge breaker shafts shall be supported at each end by heavy duty bearing blocks and ball bearings. Shafts shall be driven off a separate 7.5 HP right angle gearmotor drive, which will allow bridge breaker to operate at different speeds than pump. Single drive shall turn both shafts in a counter

rotating direction through a set of grease lubricated timing gears. Bearing blocks, ball bearings, and timing gears shall be protected from contamination by pumped material through a wide atmospheric break between drive components and sealing arrangement.

C. For ease of pump maintenance, bridge breaker paddles shall be designed for easy access to pump's drive components without disturbing bridge breaker drive assembly and timing gears. Each shaft shall be a three-piece design with two end shafts and a paddle shaft. The end shafts shall be made of 416 SS, and the paddle shaft shall be made of 4140 alloy steel. Paddle shaft shall be fully removable from top of suction housing without disturbing bridge breaker bearings, timing gears, gearmotor, packing, and end shafts. Designs requiring disassembly of bridge breaker drive components to access pump drive train will not be accepted.

13.22 PERFORMANCE SPECIFICATION:

The belt press discharge pump shall be capable of pumping 15 - 25 gpm of maximum 20 – 24% sludge cake against estimated 175 psi of total discharge head at a maximum of 107 rpm. The pump shall have minimum four (4) stage rotor and stator. A stage is equal to a minimum of one complete seal line between discharge and suction pressure. The maximum rpm is based on the motor operating at 60 Hz. **The minimum pump driver horsepower shall be 20. Bridge Breaker minimum HP shall be 7.5 HP.**

NOTE:

1. Ancillary item to be supplied is Process Controls supplied ABB laser level transmitter Model LM80.AP801-FM-P804-LCD2 including NEMA 4X control.

2. Contractor to provide transition hopper. Chute design from press to pump inlet should be no more than 10 degrees from vertical. Any angularity will encourage creation of bridge. Convex design at pump inlet on long chutes is preferred.

14.0 PERFORMANCE TESTING

14.1 The equipment manufacturer shall conduct a performance test to demonstrate that the installed equipment can meet the specified performance requirements. One press shall be selected for testing. The test shall occur as soon as possible after successful equipment start-up and process and system stabilization has been accomplished.

14.2 The test period shall consist of two five-hour steady state test runs on two consecutive days with sludge feed, sludge cake and effluent (combined filtrate and washwater) samples taken at the start of each run and every hour thereafter resulting in a total of twelve samples of each type. The sludge feed and effluent samples shall be analyzed for total suspended solids content; the cake samples shall be analyzed for total solids content. The resulting solids contents shall be averaged, and the average value of each type shall be used to judge satisfactory performance. Polymer solution strength and flow rate shall be recorded. Sludge feed rate shall be recorded.

14.3 The press manufacturer's representative shall operate the equipment during the test. The owner shall furnish personnel to assist in the operation and to take samples. The owner shall also furnish sludge, water, polymer, utilities, sludge cake disposal, routine test equipment, and laboratory services for analyzing the samples. The belt press manufacturer shall recommend the most suitable polymer for furnish by the owner. The contractor shall provide any special instrumentation for measuring sludge feed or polymer feed rates.

14.4 The equipment shall have passed the performance test if the specified cake solids, solids capture, and polymer use requirements are met with the press operating at the specified hydraulic and solids loading rates.

14.5 Should the installed equipment fail to meet the specified performance requirements, the manufacturer shall within 30 days make changes in the equipment or method of operation as necessary and the equipment shall be retested. If after a second 30-day period the equipment still does not meet the performance criteria, the equipment shall have failed the performance test and the owner shall require its removal and replacement with the specified equipment at no additional cost to the owner.

END OF SECTION

INDEX TO

SECTION 31 23 19.01 – DEWATERING

SECTION 31 23 19.01

DEWATERING

PART 1 – GENERAL

1.01 SUBMITTALS

A. Informational Submittals: Copies of any authorization and permits required to perform dewatering activities.

1. Water control plan.

2. Well permits.

3. Discharge permits.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

3.01 GENERAL

A. The Contractor shall be responsible for design, installation, and operation of a dewatering system to keep excavation free of water.

3.02 SURFACE WATER CONTROL

A. Remove surface runoff controls when no longer needed.

3.03 DEWATERING SYSTEMS

A. Provide, operate, and maintain dewatering systems of sufficient size and capacity to permit excavation and subsequent construction in the dry and to lower and maintain groundwater level a minimum of two feet below the lowest point of excavation. Continuously maintain excavations free of water, regardless of source, and until backfilled to final grade.

B. Dewatering systems shall include wells or well points and other equipment and appurtenances necessary to maintain specified groundwater elevation. Systems shall be installed outside structural limits and sufficiently below lowest point of excavation.

C. Design and Operate Dewatering Systems:
1. To prevent loss of ground as water is removed.

2. To avoid inducing settlement or damage to existing facilities completed Work, or adjacent property.

3. To relieve artesian pressures and resultant uplift of excavation bottom.

D. Provide supplemental ditches and sumps only as necessary to collect water from local seeps. Do not use ditches and sumps as primary means of dewatering.

3.04 DISPOSAL OF WATER

A. Obtain discharge permit for water disposal from authorities having jurisdiction.

B. Treat water collected by dewatering operations, as required by regulatory agencies, prior to discharge.

END OF SECTION

INDEX TO

SECTION 31 23 23 – FILL AND BACKFILL

SECTION 31 23 23

FILL AND BACKFILL

PART 1 – GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM):

a. C117, Standard Test Method for Materials Finer Than 75–Micrometers (No. 200) Sieve in Mineral Aggregates by Washing.

b. C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

c. D75, Standard Practice for Sampling Aggregates.

d. D1556, Standard Test Method for Density and Unit Weight of Soil in Place by the Sand–Cone Method.

e. D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.–lbf/ft^3 (2,700 kN–m/m3).

f. D2922, Standard Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth).

1.02 DEFINITIONS

A. Relative Compaction:

1. Ratio, in percent, of as–compacted field dry density to laboratory maximum dry density as determined in accordance with ASTM D1557.

2. Apply corrections for oversize material to either as–compacted field dry density or maximum dry density, as determined by Geotechnical Engineer.

B. Optimum Moisture Content:

1. Determined in accordance with ASTM Standard specified to determine maximum dry density for relative compaction.

2. Determine field moisture content on basis of fraction passing 3/4–inch sieve.

C. Prepared Ground Surface: Ground surface after completion of required demolition, clearing and grubbing, scalping of sod, stripping of topsoil, excavation to grade, and sub grade preparation.

D. Completed Course: A course or layer that is ready for next layer or next phase of Work.

E. Lift: Loose (uncompacted) layer of material.

F. Geosynthetics: Geotextiles, geogrids, or geo–membranes.

G. Well–Graded:

1. A mixture of particle sizes with no specific concentration or lack thereof of one or more sizes.

2. Does not define numerical value that must be placed on coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters.

3. Used to define material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids.

H. Influence Area: Area within planes sloped downward and outward at 60–degree angle from horizontal measured from:

1. One foot outside outermost edge at base of foundations or slabs.

2. One foot outside outermost edge at surface of roadways or shoulder.

3. One-half foot outside exterior at spring line of pipes or culverts.

I. Borrow Material: Material from required excavations or from designated borrow areas on or near Site. Material to be provided by Contractor.

J. Selected Backfill Material: Materials available onsite that geotechnical Engineer determines to be suitable for specific use.

K. Imported Material: Materials obtained from sources offsite, suitable for specified use.

L. Granular Fill: Fill materials as required under structures, pavements, and other facilities.

M. Embankment Material: Fill materials required to raise existing grade in areas other than under structures, pavements, and other facilities.

N. Standard Specifications: When referenced in this section, shall mean South Carolina Department of Transportation Standard Specification for Road and Bridge Construction, latest edition.

O. Controlled Fill: Fill materials as required under structures, around pipes, in trenches, and backfill for structures. As defined herein, in accordance with the Geotechnical Report.

1.03 SUBMITTALS

A. Informational Submittals: Certified test results from independent testing agency.

1.04 QUALITY ASSURANCE

A. Notify Engineer when:

1. Structure, tank, or area is ready for backfilling, and whenever backfilling operations are resumed after a period of inactivity.

2. Soft or loose subgrade materials are encountered wherever embankment or site fill is to be placed.

3. Fill material appears to be deviating from Specifications.

B. Testing and Inspection Services:

1. An independent geotechnical testing agency, qualified in accordance with ASTM E 329, shall, at a minimum, conduct soil materials and properties and compaction testing. The geotechnical testing agency shall designate, from within, a Geotechnical Engineer, registered in the state of Georgia, to serve as the main point of contact and geotechnical advisor on the project during construction.

2. The Owner shall approve of the testing agency.

3. The testing agency will be paid for by the Contractor.

4. At a minimum, in-place field density tests shall be conducted at the following locations. Exact locations are to be determined by the Geotechnical Engineer.

   a. One test within the Building footprints.
   b. Two tests shall be conducted within the main Basin footprint.
   c. One test shall be conducted on the south end of the main Basin structure where the equipment pads are located.
   d. One test shall be conducted within the Primary Influent Screen footprint.
   e. Other locations as designated by the Geotechnical Engineer.

5. Contractor shall provide access for testing agency to perform soil testing and inspection services for quality control during earthwork operations.

6. Fill and Backfill placement shall be observed by a qualified Engineering Technician working under the direction of the designated Geotechnical Engineer.

1.05 SEQUENCING AND SCHEDULING

A. Complete applicable Work specified in Section 02 41 13 Selective Site Demolition, Section 31 10 00 Site Clearing, Section 31 23 16 Excavation, and Section 31 23 13 Subgrade Preparation, prior to placing fill or backfill.

B. Backfill against concrete structures only after concrete has attained compressive strength, as specified in Section 03 30 00 Cast-in-Place Concrete. Obtain Engineer's acceptance of concrete work and attained strength prior to placing backfill.

C. Backfill around water-holding structures only after completion of satisfactory leakage tests as specified in Section 03 30 00 Cast-in-Place Concrete.

D. Backfill around buried tanks only after tank is set in position and anchored and exterior pipes and other equipment are in place and securely anchored.

E. Do not place granular base, sub-base, or surfacing until after subgrade has been prepared as specified in Section 31 23 13, Subgrade Preparation.

PART 2 – PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. Gradation Tests:

1. As necessary to locate acceptable sources of imported material.

2. During production of imported material, test as follows:

a. Granular Fill: One Test per 2,000 CY.

B. Samples: Collected in accordance with ASTM D75:

1. During production of imported material, provide Samples as follows:

a. Granular Fill: One sample for every 2,000 CY.

2.02 EARTH FILL

A. Excavated material from required excavations free from rocks larger than 3 inches, from roots and other organic matter, ashes, cinders, trash, debris, and other deleterious materials.

B. Provide imported material of equivalent quality, if required, to accomplish Work.

2.03 GRANULAR FILL

A. One-inch minus crushed gravel, sand, or crushed rock.

B. Free from dirt, clay balls, and organic material.

C. Well-graded from coarse to fine and containing sufficient fines to bind material when compacted, but with maximum 12 percent by weight passing No. 200 sieve.

2.04 CONTROLLED FILL

A. Cohesion-less soil containing a maximum of 12 percent by weight passing No. 200 sieve.

B. The soil shall be free of organics, deleterious material and elongated or flat particles susceptible to degradation.

C. A maximum dry density of at least 100 pcf as determined by a laboratory modified Proctor compaction test (ASTM D1557).

D. Uses classifications SP, SM, SP-SM, GP, GW, and SW.

2.05 WATER FOR MOISTURE CONDITIONING

A. Free of hazardous or toxic contaminates, or contaminants deleterious to proper compaction.

2.06 BASE COURSE

A. As specified in Section 32 11 23, Aggregate Base Courses.

PART 3 – EXECUTION

3.01 GENERAL

A. Keep placement surfaces free of water, debris, and foreign material during placement and compaction of fill and backfill materials.

B. All fill and backfill placement shall be observed by a qualified Engineering Technician working under the direction of the Geotechnical Engineer.

C. Place and spread fill and backfill materials in horizontal lifts of uniform thickness, in a manner that avoids segregation. Compact each lift to specified density prior to placing succeeding lifts. Slope lifts only where necessary to conform to final grades or as necessary to keep placement surfaces drained of water. Place in maximum thickness of loose fill layers of ten inches (use maximum thickness of two to four inches if hand-guided equipment (jumping jack or plate compactor) is used).

D. During filling and backfilling, keep level of fill and backfill around each structure and buried tank even.

E. Do not place fill or backfill, if fill or backfill material is frozen, or if surface upon which fill or backfill is to be placed is frozen.

F. If pipe, conduit, duct bank, or cable is to be laid within fill or backfill:

1. Fill or backfill to an elevation two feet above top of item to be laid.

2. Excavate trench for installation of item.

3. Install bedding, if applicable, as specified in Section 31 23 23.15 Trench Backfill.

4. Install item.

5. Backfill envelope zone and remaining trench, as specified in Section 31 23 23.15 Trench Backfill, before resuming filling or backfilling specified in this section.

G. Tolerances:

1. Final Lines and Grades: Within a tolerance of one-tenth of a foot unless dimensions or grades are shown or specified otherwise.

2. Grade to establish and maintain slopes and drainage as shown. Reverse slopes are not permitted.

H. Settlement: Correct and repair any subsequent damage to structures, pavements, curbs, slabs, piping, and other facilities, caused by settlement of fill or backfill material.

I. Use of granular and controlled fill material shall be approved by the Geotechnical Engineer. Alternate material may be designated by Geotechnical Engineer to replace soft yielding soil if deemed necessary.

3.02 BACKFILL

A. Under Site Features: Within influence area beneath sidewalks, pavements, curbs, piping, conduits, duct banks, and other site facilities, backfill with Granular Fill, unless otherwise shown. Place in lifts of 10–inch maximum thickness and compact each lift to minimum of 97 percent of the modified Proctor maximum dry density, as determined in accordance with ASTM D1557.

B. Under Structural Features: Within influence area beneath structural slabs and foundations, backfill with Controlled Fill, unless otherwise shown. Place in lifts of 10–inch maximum thickness and compact each lift to minimum of 97 percent of the modified Proctor maximum dry density, as determined in accordance with ASTM D1557.

C. Around Tanks and against Basin walls: Install Controlled Fill and place in lifts of 10–inch maximum thickness and compact each lift to minimum of 97 percent of the modified Proctor maximum dry density, as determined in accordance with ASTM D1557. Geotechnical Engineer shall provide allowable methods of compaction in these areas.

D. Other Areas: Backfill with earth fill to lines and grades shown, with proper allowance for topsoil thickness where shown. Place in lifts of 10–inch maximum thickness and compact each lift to minimum 97 percent of the modified Proctor maximum dry density, as determined in accordance with ASTM D1557.

3.03 FILL

A. Outside Influence Areas and not Beneath Structures, Tanks, Pavements, Curbs, Slabs, Piping, and Other Facilities: Unless otherwise shown, place earth fills as follows:

1. Allow for four–inch thickness of topsoil where required.

2. Maximum 10–inch thick lifts.

3. Place and compact fill across full width of embankment.

4. Compact to minimum 97 percent of the modified Proctor maximum dry density, as determined in accordance with ASTM D1557.

5. Dress completed embankment with allowance for topsoil, crest surfacing, and slope protection, where applicable.

3.04 SITE TESTING

A. Gradation:

1. Frequency shall be determined by Geotechnical Engineer. At a minimum, one sample from each 1,500 tons of finished product. If variation in gradation is occurring or if material appears to depart from Specifications, more frequent sampling may be required.

2. If test results indicate material does not meet Specification requirements, terminate material placement until corrective measures are taken.

3. Remove material that does not meet Specification requirements.

B. At a minimum, both in-place field density (ASTM D1556 or D2922) and compaction (ASTM D1557 or other permitted by Geotechnical Engineer) tests shall be conducted during placement of materials in accordance with the following list (except where noted otherwise). Exact locations are to be determined by the Geotechnical Engineer.

1. Two tests within the Building footprint.
2. Six tests shall be conducted within the main Basin footprint.
3. Two tests shall be conducted on the south end of the main Basin structure where the equipment pads are located.
4. Two tests shall be conducted within the Primary Influent Screen footprint.
5. One density test for every 2,000 square feet of each lift or one test per lift, whichever is greater.
6. Other locations as designated by the Geotechnical Engineer.

C. Contractor shall provide access for testing agency to perform soil testing and inspection services for quality control during earthwork operations.

3.05 GRANULAR BASE, SUBBASE, AND SURFACING

A. Place and Compact as specified in Section 32 11 23 Aggregate Base Courses and the Standard Specifications.

3.06 REPLACING OVEREXCAVATED MATERIAL

A. Replace excavation carried below grade lines shown or established by Engineer as follows:

1. Beneath footings: Controlled Fill.

2. Beneath Fill or Backfill: Same material as specified for overlying fill or backfill.

3. Beneath Slabs–On–Grade: Controlled Fill.

4. Trenches:

   a. Unauthorized Over–excavation: Granular Fill.

   b. Authorized Over–excavation: Granular Fill.

5. Permanent Cut Slopes (Where Overlying Area is Not to Receive Fill or Backfill):

   a. Flat to Moderate Steep Slopes (3: 1, Horizontal Run: Vertical Rise or Flatter): Earth fill.

   b. Steep Slopes (Steeper than 3:1):

      1. Correct over–excavation by transitioning between overcut areas and designed slope adjoining areas, provided such cutting does not extend offsite or outside easements and right–of–ways, or adversely impacts existing facilities, adjacent property, or completed Work.

      2. Backfilling over–excavated areas are prohibited, unless in Engineer's opinion, backfill will remain stable, and over–excavated material is replaced as compacted earth fill.

3.07 ACCESS ROAD SURFACING

A. Place and compact as specified in Section 32 11 2, Aggregate Base Courses and the Standard Specifications.

END OF SECTION

INDEX TO

SECTION 31 23 23.15 – TRENCH BACKFILL

SECTION 31 23 23.15

TRENCH BACKFILL

PART 1 – GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Fort Pierce Utility Authority Design and Construction Standards for Water and Wastewater System, latest edition.

2. American Public Works Association (APWA): Uniform Color Code for Temporary Marking of Underground Utility Locations.

3. ASTM International (ASTM):

   a. C33, Standard Specification for Concrete Aggregates.
   b. C94/C94M, Standard Specification for Ready-Mixed Concrete.
   c. C 117, Standard Test Method for Materials Finer than 75 Micrometer (No. 200) Sieve in Mineral Aggregates by Washing.
   d. C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
   e. C150, Standard Specification for Portland Cement.
   f. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
   g. D1140, Standard Test Method for Amount of Material in Soils Finer than the No. 200 (75 micrometer) Sieve.
   h. D1557, Standard Test Method for Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft.-lbf/ft^3 (2,700 kN-mlm^3)).

4. National Electrical Manufacturers Association (NEMA): Z535.1, Safety Color Code.

1.02 DEFINITIONS

A. Base Rock: Granular material upon which manhole bases and other structures are placed.

B. Bedding Material: Granular material upon which pipes, conduits, cables, or duct banks are placed.

C. Imported Material: Material obtained by Contractor from source(s) offsite.

D. Lift: Loose (uncompacted) layer of material.

E. Pipe Zone: Backfill zone that includes full trench width and extends from prepared trench bottom to an upper limit above top outside surface of pipe, conduit, cable or duct bank.

F. Prepared Trench Bottom: Graded trench bottom after excavation and installation of stabilization material, if required, but before installation of bedding material.

G. Relative Compaction: The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by ASTM D1557. Corrections for oversize material may be applied to either as compacted field dry density or maximum dry density, as determined by Engineer.

H. Selected Backfill Material: Material available onsite that Geotechnical Engineer determines to be suitable for a specific use.

I. Well-Graded: A mixture of particle sizes that has no specific concentration or lack thereof of one or more sizes producing a material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids. Well-graded does not define any numerical value that must be placed on the coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters.

1.03 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Manufacturer's descriptive literature for marking tapes.

B. Informational Submittals:

1. Catalog and manufacturer's data sheets for compaction equipment.

2. Certified Gradation Analysis: Submit not less than 30 days prior to delivery for imported materials or anticipated use for excavated materials, except for trench stabilization material that will be submitted prior to material delivery to Site.

PART 2 – PRODUCTS

2.01 MARKING TAPE

A. Plastic:

1. Inert polyethylene, impervious to known alkalis, acids, chemical reagents, and solvents likely to be encountered in soil.

2. Thickness: Minimum 4 mils.

3. Width: 3 inches.

4. Identifying Lettering: Minimum one-inch high, permanent black lettering imprinted continuously over entire length.

5. Manufacturers and Products:

   a. Reef Industries; Terra Tape.
   b. Allen; Markline.

B. Metallic:

1. Solid aluminum foil, visible on unprinted side, encased in a protective high visibility, inert polyethylene plastic jacket.

2. Foil Thickness: Minimum 5.5 mils.

3. Width: 3 inches.
4. Identifying Lettering: Minimum one-inch high, permanent black lettering imprinted continuously over entire length.

5. Joining Clips: Tin or nickel-coated furnished by tape manufacturer.

6. Manufacturers and Products:

   a. Reef Industries; Terra "D."
   b. Allen; Detectatape.

C. Color: In accordance with APWA Uniform Color Code for Temporary Marking of Underground Facilities.

Color*	Facility
Red	Electric power lines, cables, conduit, and lightning cables
Orange	Communicating alarm or signal lines, cables, or conduit
Yellow	Gas, oil, steam, petroleum, or gaseous materials
Green	Sewers and drain lines
Blue	Potable water
Purple	Reclaimed water, effluent water, irrigation, and slurry lines
*As specified in NEMA Z535.1, Safety Color Code.	

2.02 TRENCH STABILIZATION MATERIAL

A. No 57 stone (granite).

2.03 BEDDING MATERIAL AND PIPE ZONE MATERIAL

A. Granular fill as specified in Section 31 23 23 Fill and Backfill.

2.04 EARTH BACKFILL

A. Earth fills as specified in Section 31 23 23 Fill and Backfill.

B. Free from roots or organic matter, refuse, boulders and material larger than 112 cubic feet, or other deleterious materials.

2.05 GRAVEL SURFACING ROCK

A. As specified in Section 32 11 23 Aggregate Base Courses.

2.06 SOURCE QUALITY CONTROL

A. Perform gradation analysis, as specified by Geotechnical Engineer, in accordance with ASTM C136 for:

1. Earth backfill, including specified class.

2. Trench stabilization material.

3. Bedding and pipe zone material.

PART 3 – EXECUTION

3.01 TRENCH PREPARATION

A. Water Control:

1. Promptly remove and dispose of water entering trench as necessary to grade trench bottom and to compact backfill and install manholes, pipe, conduit, direct-buried cable, or duct bank. Do not place concrete, lay pipe, conduit, direct-buried cable, or duct bank in water. Control groundwater as specified in Section 31 23 19.01 Dewatering.

2. Remove water in a manner that minimizes soil erosion from trench sides and bottom.

3. Provide continuous water control until trench backfill is complete.

B. Remove foreign material and any backfill materials that are contaminated with foreign materials that fall into trench.

3.02 TRENCH BOTTOM

A. Firm Sub grade: Grade with hand tools, remove loose and disturbed material, and trim off high areas and ridges left by excavating bucket teeth. Allow space for bedding material if shown or specified.

B. Soft Subgrade: If subgrade is encountered that may require removal to prevent pipe settlement, notify Engineer. Engineer will determine depth of over excavation, if any required.

3.03 TRENCH STABILIZATION MATERIAL INSTALLATION

A. Rebuild trench bottom with trench stabilization material.

B. Place material over full width of trench in six-inch lifts to required grade, providing allowance for bedding thickness.

C. Compact each lift so as to provide a firm, unyielding support for the bedding material prior to placing succeeding lifts.

3.04 BEDDING

A. Furnish imported bedding material where, in the opinion of Engineer, excavated material is unsuitable for bedding or insufficient in quantity.

B. Place over the full width of the prepared trench bottom in two equal lifts when the required depth exceeds eight inches.

C. Hand grade and compact each lift to provide a firm, unyielding surface.

D. Minimum Thickness as follows:

1. Pipe 15 Inches and Smaller: four inches.

2. Pipe 18 Inches to 36 Inches: six inches.

3. Pipe 42 Inches and Larger: eight inches.

4. Conduit: three inches.

5. Direct-Buried Cable: three inches.

6. Duct Banks: three inches.

E. Check grade and correct irregularities in bedding material. Loosen top one inch to two inches of compacted bedding material with a rake or by other means to provide a cushion before laying each section of pipe, conduit, direct-buried cable, or duct bank.

F. Install to form continuous and uniform support except at bell holes, if applicable, or minor disturbances resulting from removal of lifting tackle.

G. Bell or Coupling Holes: Excavate in bedding at each joint to permit proper assembly and inspection of joint and to provide uniform bearing along barrel of pipe or conduit.

3.05 BACKFILL PIPE ZONE

A. Upper Limit of Pipe Zone shall not be Less than Following:

1. Pipe: 12 inches, unless shown otherwise.

2. Conduit: three inches, unless shown otherwise.

3. Direct-Buried Cable: three inches, unless shown otherwise.

4. Duct Bank: three inches, unless shown otherwise.

B. Restrain pipe, conduit, cables, and duct banks as necessary to prevent their movement during backfill operations.

C. Place material simultaneously in lifts on both sides of pipe and, if applicable, between pipes, conduit, cables, and duct banks installed in same trench.

1. Pipe Ten-Inch Diameter and less: First lift less than or equal to pipe diameter.

2. Pipe Over Ten-Inch Diameter: Maximum six-inch lifts.

D. Thoroughly tamp each lift, including area under haunches, with handheld tamping bars supplemented by mechanical tamping equipment, plate vibratory compaction, and or concrete vibrators to ensure that voids are completely filled before placing each succeeding lift.

E. After the full depth of the pipe zone material has been placed as specified, compact the material by a minimum of three passes with a vibratory plate compactor only over the area between the sides of the pipe and the trench walls. Compact the pipe zone material to at least 95 percent of the maximum dry density, as determined by ASTM D1557.

F. Do not use power-driven impact compactors to compact pipe zone material.

3.06 MARKING TAPE INSTALLATION

A. Continuously install marking tape along centerline of all buried piping, on top of last lift of pipe zone material. Coordinate with piping installation Drawings.

3.07 BACKFILL ABOVE PIPE ZONE

A. General:

1. Process excavated material to meet specified gradation requirements.

2. Adjust moisture content as necessary to obtain specified compaction.

3. Do not allow backfill to free fall into the trench or allow heavy, sharp pieces of material to be placed as backfill until after at least two feet of backfill has been provided over the top of pipe.

4. Do not use power driven impact type compactors for compaction until at least four feet of backfill is placed over top of pipe.

5. Backfill to grade with proper allowances for topsoil, crushed rock surfacing, and pavement thicknesses, wherever applicable.

6. Backfill around structures with same class backfill as specified for adjacent trench unless otherwise shown or specified.

3.08 REPLACEMENT OF TOPSOIL

A. Replace topsoil in top six inches of backfilled trench.

B. Maintain the finished grade of topsoil even with adjacent area and grade as necessary to restore drainage.

3.09 MAINTENANCE OF TRENCH BACKFILL

A. After each section of trench is backfilled, maintain the surface of the backfilled trench even with the adjacent ground surface until final surface restoration is completed.

B. Gravel Surfacing Rock: Add gravel surfacing rock where applicable and as necessary to keep the surface of the backfilled trench even with the adjacent ground surface. Grade and compact as necessary to keep the surface of backfilled trenches smooth, free from ruts and potholes, and suitable for normal traffic flow.

C. Topsoil: Add topsoil where applicable and as necessary to maintain the surface of the backfilled trench level with the adjacent ground surface.

D. Concrete Pavement: Replace settled slabs as specified in Section 32 12 16 Asphalt Paving.

E. Asphaltic Pavement: Replace settled areas or fill with asphalt as specified in Section 32 12 16 Asphalt Paving.

F. Other Areas: Add excavated material where applicable and keep the surface of the backfilled trench level with the adjacent ground surface.

3.10 SETTLEMENT OF BACKFILL

A. Settlement of trench backfill, fill, or facilities constructed over trench backfill will be considered a result of defective compaction of trench backfill.

END OF SECTION

INDEX TO

SECTION 31 25 00GA – EROSION AND SEDIMENTATION CONTROLS (GA)

SECTION 31 25 00GA

EROSION AND SEDIMENTATION CONTROLS (GA)

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Soil erosion, sediment, and pollution control measures shall include all temporary and permanent means of soil protection, trapping soils and containment of pollutants on the construction site during land disturbing activities. Activities covered in this section are regulated by the Manual for Erosion and Sediment Control in Georgia (latest revision) and Georgia's National Pollutant Discharge Elimination System Permit (NPDES), General Permit No. GAR100001.

B. Reporting

C. Sampling

1.2 RELATED SECTIONS

A. Section 31 00 00 – Earthwork

B. Section 31 10 00 – Site Clearing

C. Section 33 10 00 – Water Utilities

D. Section 33 30 00 – Sanitary Sewerage Utilities

E. Section 33 40 00 – Storm Drainage Utilities

1.3 PURPOSES

A. The purpose of this section is to achieve the following goals:

1. Minimize soil exposure by proper timing of clearing grading and construction.

2. Retain existing vegetation whenever feasible.

3. Vegetate and mulch disturbed areas as soon as possible.

4. Divert runoff away from disturbed areas.

5. Minimize length and steepness of slopes when it is practical.

6. Reduce runoff velocities with check dams or surface roughing.

7. Trap sediment on site.

8. Inspect and maintain erosion, sedimentation, and pollution control measures.

9. Report on condition of Best Management Practices (BMPs).

10. Sample site run off per Georgia's NPDES Permit.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of soil erosion, sedimentation and pollution control systems products of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

Codes and Standards: Comply with all applicable Local, State, and Federal Standards pertaining to soil erosion, sedimentation, and pollution control.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instruction for soil erosion, sedimentation and pollution control materials and products.

1.6 MEASUREMENT AND PAYMENT

A. No unit measurements will be made for soil erosion control. Payment will be made at the lump sum price as shown on the bid proposal. The cost of soil erosion control shall include all equipment, labor, maintenance, monitoring, reporting, and materials necessary to comply with the State of Georgia NPDES Permit.

PART 2 – PRODUCTS

2.1 VEGETATIVE MATERIALS

A. Mulch

1. Dry straw or hay.

2. Wood chips, sawdust or bark.

3. Cutback asphalt.

B. Temporary Seeding

1. Annual Ryegrass

2. Browntop Millet

C. Permanent Seeding

1. Common Bermuda

2. Centipede

D. Sod

1. Common Bermuda

2. Centipede

3. St. Augustine

E. Fertilizer

1. Commercial 6–12–12

2.2 STRUCTURAL MATERIALS

A. Check Dam

1. Stone (2" – 10")

2. Bales of densely baled hay or straw wrapped with synthetic or wire bands (two minimum per bale).

B. Construction Exit

1. Minimum 20' x 50' x 0.5' layer of 1.5" to 3.5" stone with a geotextile underliner.

C. Filter Ring

1. Minimum 2' high stone ring. Stone shall be no smaller than 3" to 5" when utilized at storm drain inlets and pond outlets with pipe diameters less than 12".

2. Minimum 2' high stone ring. Stone shall be no smaller than 10" to 15" when utilized at storm drain inlets and pond outlets with pipe diameters greater than 12".

D. Sediment Barrier

1. Bales of densely baled hay or straw wrapped with synthetic or wire bands (two minimum per bale).

2. Silt Fence – Shall be a woven geotextile fabric sheet of plastic yarn composed of a long chain synthetic polymer with at least 85% by weight propylene, ethylene, amide, ester or vinylidene chloride, and shall contain stabilizers and/or inhibitors added to the base plastic to make the filaments resistant to deterioration due to ultra–violet and/or heat exposure. The fabric shall be finished so the filaments will retain their relative position with respect to each other. The fabric shall be free of defects, rips, holes, or flaws. The manufacturer shall have either an

approved color mark yarn in the fabric or label the fabricated silt fence with both the manufacturer and fabric name every 100'.

The fabric shall meet the following requirements:

Grab Strength	90 lbs.
Mullen Burst Strength	150 lbs.
UV Resistance	80 %

E. Inlet Sediment Trap

1. Silt fence (Type C) supported by steel posts.

2. Baffle Box – Constructed of 2" x 4" boards spaced a maximum of 1" apart or plywood with weep holes 2" in diameter (See detail).

3. Sod Inlet Protection – Four – 1 foot wide strips of sod on each side of the inlet (See detail).

4. Curb Inlet Protection – Eight inch concrete blocks wrapped in filter fabric, placed in front of a curb inlet.

F. Storm Drain Outlet Protection

1. Geotextile fabric equivalent to Mirafi FW700.

2. Rip–rap (See detail for size).

2.3 CHEMICAL MATERIALS

A. Dust Control – Calcium Chloride, Anionic Asphalt Emulsion, Latex Emulsion, or Resin–in–Water Emulsion.

B. Anionic Polyacrylamide (PAM) – Consult state and local laws concerning the regulations of this chemical.

PART 3 – EXECUTION

3.1 GENERAL

A. All disturbed soil areas except those to support paving shall be graded and protected from erosion with vegetative materials. Sedimentation discharge from the construction site into natural drainage ways and storm drainage systems shall be prevented by means of vegetative measures and temporary structural practices. These vegetative measures and structural practices are known as Best Management Practices (BMPs). Rainfall, pollution control measures, and construction exit condition shall be monitored and reported on each day when construction activities take place. Erosion and sedimentation control measures shall be monitored and reported on every seven days and within 24 hours of a qualifying rainfall event of 0.5 inches or more. Sampling of construction site discharging water shall be sampled within 45 minutes of a qualifying rainfall event

and analyzed immediately or no later than 48 hours after collection. The above reports shall be submitted to the Georgia EPD by the fifteenth day of the month following the reporting period.

B. The Contractor (Operator) is considered a "Primary Permittee" and shall submit a Notice of Intent (NOI) in accordance with General Permit No. [GAR100001], [GAR100002], or [GAR100003] at least 14 days prior to the commencement of construction activities. Contractor shall retain a copy of the Erosion, Sedimentation, and Pollution Control Plan and Comprehensive Monitoring Program required by above permit at construction site or be readily available at a designated alternate location from date of project initiation to date of final stabilization. Copies of all Notice of Intent, Notice of Termination, plans, monitoring reports and all other records required by above permit shall be retained by Contractor for a period of at least three years from date the site is finally stabilized. Copies of Notice of Intent (NOI), Notice of Termination (NOT) and General Permit Number GAR100001 are found at the end of this section.

3.2 ON–SITE OBSERVATION

A. Engineer is required by General Permit No. GAR100001 to check the installation of Erosion, Sedimentation and Pollution Control measures within one week after initial construction activities commence. The Contractor shall notify Engineer within 24 hours of control measures installation for the above site visit. Engineer, within the above parameters, shall check subsequent installation of control measures.

3.3 VEGETATIVE PRACTICES

A. Mulch

1. Dry straw or hay shall be applied at a depth of 2 to 4 inches by hand or mechanical equipment providing complete soil coverage. Straw or hay shall be anchored immediately after application. Straw or hay can be anchored with a disk harrow, packer disk or emulsified asphalt.

2. Wood chips, sawdust, or bark shall be applied at a depth of 2 to 3 inches by hand or mechanical equipment providing complete soil coverage. Netting of the appropriate size shall be used to anchor the above materials.

3. Cutback asphalt shall be applied at 1,200 gallons per acre or 1/4 gallon per square yard.

B. Seeding

1. Seed shall be applied uniformly by hand, cyclone seeder, drill, cultipacker seeder, or hydraulic seeder. Drill or cultipacker seeders shall place seed 1/4" to 1/2" deep. Soil shall be raked lightly to cover seed with soil if seeded by hand.

2. During times of drought, water shall be applied at a rate not causing runoff and erosion. The soil shall be thoroughly wetted to depth insuring

germination of the seed. Subsequent applications of water shall be made when needed.

3. Refer to Section 32 92 00 – Turf and Grasses for additional seeding requirements.

C. Sodding

1. Bring soil surface to final grade. Clear surface of trash, woody debris stones, and dirt clods larger than 1". Mix fertilizer into soil surface. Apply sod to soil when surface is not muddy or frozen. Lay sod with tight joints and in straight lines. Do not overlap joints. Stagger joints and do not stretch sod. On slopes steeper than 3:1, sod shall be anchored with pins or other approved methods. Installed sod shall be rolled or tamped to provide good contact between sod and soil. Irrigate sod and soil to a depth of 4" immediately after installation. Irrigation shall be used to supplement rainfall for a minimum of 2–3 weeks.

2. Refer to Section 32 92 00 – Turf and Grasses for additional sodding requirements.

3.4 STRUCTURAL MEASURES

A. Check Dam

1. Stone – Shall be constructed of graded size 2–10 inch stone underlayed with a geotextile fabric. Mechanical or hand placement shall be required to insure complete coverage of entire width of ditch or swale and center of dam is lower than edges. Sediment shall be removed when it reaches a depth of one–half the original dam height or before.

2. Haybale – Shall be staked and embedded a minimum of 4" and may be used as temporary check dams in concentrated flow areas while vegetation is becoming established. They should not be used where the drainage area exceeds one acre. Sediment shall be removed when it reaches a depth of one–half the original dam height or before.

B. Construction Exit

1. A stone stabilized pad shall be located at any point where traffic will be leaving the construction site to a public right–of–way, street, alley, sidewalk, parking area or any other area where there is a transition from bare soil to a paved area. The pad shall be constructed of 1.5" to 3.5" stone, having a minimum thickness of 6" and not less than 20' wide and 50' long. The pad shall be underlayed with a geotextile fabric. The pad shall be maintained in a condition, which will prevent tracking or flow of mud onto public rights–of–way. This may require periodic top dressing with 1.5" to 3.5" stone. All materials spilled, dropped, washed, or tracked from vehicles or site onto roadways or into storm drains must be removed immediately.

C. Filter Ring

1. Shall surround all sides of the structure receiving runoff from disturbed areas. It shall be placed a minimum of 4' from the structure. It may also be used below storm drains discharging into detention ponds, creating a centralized area for sediment accumulation. When utilized below a storm drain outlet, it shall be placed such that it does not create a condition causing water to back–up into the storm drain and inhibit the function of the storm drain system. The larger stone can be faced with smaller filter stone on the upstream side for added sediment filtering capabilities. Mechanical or hand placement of stone shall be required to uniformly surround the structure.

2. Filter ring must be kept clear of trash and debris. This requires continuous monitoring and maintenance, which includes sediment removal when one–half full. Filter rings are temporary and should be removed when the site has been stabilized.

D. Sediment Barrier

1. Hay or straw bales may be used in areas of low sheet flow rates. They shall not be use if the project duration is expected to exceed three months. Bales shall be placed in a single row, lengthwise, and embedded in the soil to a depth of 4". Bales must be securely anchored in place by stakes or bars driven through the bales or by other acceptable means to prevent displacement. Bales shall be placed so the binding wire or twine around the bale will not touch the soil. Sediment shall be removed once it has accumulated to one–half the original height of the barrier. Barriers shall remain in place until disturbed areas have been permanently stabilized. All sediment accumulated at the barrier shall be removed and properly disposed of before the barrier is removed. The slope lengths contributing runoff to a bale barrier cannot exceed those listed below.

Land Slope (Percent)	Maximum Slope Length Above Bale (Feet)
< 2	75
2 to 5	50
5 to 10	35
10 to 20	20
> 20	10

2. Silt fence may be used in areas of higher sheet flow rates. The drainage area shall not exceed ¼ acre for every 100' of silt fence. **Silt fence shall not be installed across streams, ditches, waterways or other concentrated flow areas.** Silt fence shall be installed according to this specification, as shown on the construction drawings or as directed by the Engineer. See details on the construction drawings for installation requirements.

   a. Type A – A 36" wide filter fabric silt fence shall be used on construction sites where the life of the project is greater than or equal to six months.

b. Type B – A 22" wide filter fabric silt fence shall be limited to use on minor projects, such as residential home sites or small commercial developments where permanent stabilization will be achieved in less than six months.

c. Type C – A 36" wide filter fabric silt fence with wire reinforcement shall be used where runoff flows or velocities are particularly high or where slopes exceed a vertical height of 10'. Along stream buffers and other sensitive areas, two rows of Type C silt fence or one row of Type C silt fence backed by hay bales shall be used.

3. Where all runoff is to be stored behind the silt fence (where no stormwater disposal system is present), the slope lengths contributing runoff to a silt fence barrier cannot exceed those listed below.

Land Slope (Percent)	Maximum Slope Length Above Fence (Feet)
< 2	100
2 to 5	75
5 to 10	50
10 to 20	25
> 20*	15

*In areas where the slope is greater than 20%, a flat area length of 10' between the toe of the slope and the fence shall be provided.

4. Sediment shall be removed once it has accumulated to one–half the original height of the barrier. Filter fabric shall be replaced whenever it has deteriorated to such an extent that the effectiveness of the fabric is reduced (approximately six months). Barriers shall remain in place until disturbed areas have been permanently stabilized. All sediment accumulated at the barrier shall be removed and properly disposed of before the barrier is removed.

E. Inlet Sediment Trap

1. Shall be installed at or around all storm drain inlets receiving runoff from disturbed areas. Sediment traps must be self draining unless they are otherwise protected in an approved manner that will not present a safety hazard. The drainage area entering the inlet sediment trap shall be no greater than one acre. Sediment traps may be constructed on natural ground surface, on an excavated surface or on machine compacted fill provided they have a non–erodible outlet.

2. Type C silt fence supported by steel posts may be used where the inlet drains a relatively flat area (slope no greater than 5%) and shall not apply to inlets receiving concentrated flows, such as in street or highway medians. The stakes shall be spaced evenly around the perimeter of the inlet a maximum of 3' apart and securely driven into the ground,

approximately 18" deep. The fabric shall be entrenched 12" and backfilled with crushed stone or compacted soil. Fabric and wire shall be securely fastened to the posts and fabric ends must be overlapped a minimum of 18" or wrapped together around a post to provide a continuous fabric barrier around the inlet. The trap shall be inspected daily and after each rain. Repairs are to be made as needed. Sediment shall be removed once it has accumulated to one–half the height of the trap. **Sediment shall not be washed into the inlet.** It shall be removed from the sediment trap and disposed of and stabilized so it will not enter the inlet again. When the contributing drainage area has been permanently stabilized, all materials and any sediment shall be removed and either salvaged or disposed of properly. The disturbed area shall be brought to proper grade, smoothed and compacted. Appropriately stabilize all disturbed areas around the inlet.

3. A baffle box shall be used for inlets receiving runoff with a higher volume or velocity. The box shall be constructed of 2" x 4" boards spaced a maximum of 1" apart or of plywood with weep holes 2" in diameter. The weep holes shall be placed approximately 6" on center vertically and horizontally. The entire box shall be wrapped in Type C filter fabric that is entrenched 12" and backfilled. Gravel shall be placed around the box to a depth of 2" to 4". The trap shall be inspected daily and after each rain. Repairs are to be made as needed. Sediment shall be removed once it has accumulated to one–half the height of the trap. **Sediment shall not be washed into the inlet.** It shall be removed from the sediment trap and disposed of and stabilized so it will not enter the inlet again. When the contributing drainage area has been permanently stabilized, all materials and any sediment shall be removed and either salvaged or disposed of properly. The disturbed area shall be brought to proper grade, smoothed and compacted. Appropriately stabilize all disturbed areas around the inlet.

4. Sod Inlet Protection shall be used only at the time of permanent seeding, to protect the inlet from sediment and mulch material until permanent vegetation has become established. The sod shall be place to form a turf mat covering the soil for a distance of 4' from each side of the inlet structure. Sod strips shall be staggered so adjacent strip ends are not aligned. Re–sod areas where an adequate stand of sod is not obtained. New sod should be mowed sparingly. Grass height should not be less than 2" to 3".

5. Curb Inlet Protection shall be used on curb inlets receiving runoff from disturbed areas once pavement has been installed. Place 8" concrete blocks wrapped in filter fabric in front of the curb inlet opening. A gap of approximately 4" shall be left between the inlet filter and the inlet to allow for overflow and prevention of hazardous ponding in the roadway. **This method of inlet protection shall be removed if a safety hazard is created.** Sediment shall be removed from curb inlet protection immediately.

F. Storm Drain Outlet Protection

1. Outlet protection aprons shall be constructed at all storm drain outlets, road culverts, paved channel outlets discharging into natural or constructed channels. Apron will extend from end of the conduit, channel, or structure to the point of entry into an existing stream or publicly maintained drainage system. Apron length, width, and stone size shall conform to details on the construction drawings. Apron shall be constructed with no slope along its length. Invert elevation of the downstream end of apron shall be equal to the elevation of the receiving channel invert. There shall be no overfall at the end of apron. Apron shall be located so there are no bends in the horizontal alignment.

2. Subgrade for geotextile fabric and rip–rap shall follow required lines and grades shown on the construction drawings. Compact any subgrade fill required to the density of surrounding undisturbed material. Low areas in subgrade on undisturbed soil may also be filled by increasing rip–rap thickness. Geotextile fabric shall be protected from punching or tearing during installation. Repair any damage by removing rip–rap and placing another piece of fabric over the damaged area. All connecting joints shall overlap a minimum of 1'. If damage is extensive, replace entire geotextile fabric. Rip–rap shall be placed by equipment or hand. Minimum thickness of rip–rap shall be 1.5 times the maximum stone diameter. Immediately after construction, stabilize all disturbed areas around apron with vegetation.

3. Check outlet apron after heavy rains to see if any erosion around or below the rip–rap has taken or if stones have been dislodged. Immediately make all needed repairs to prevent further damage.

3.5 CHEMICAL MEASURES

A. Dust Control

1. Dust raised from vehicular traffic shall be controlled by wetting down roads with water or by the use of chemicals. Chemicals shall be applied in accordance with the manufacturer's recommendations.

B. Soil Binding

1. This temporary practice is intended for direct soil surface application to sites where the timely establishment of vegetation may not be feasible or where vegetative cover is absent or inadequate. **This temporary practice is not intended for application to surface waters of the state.** It is intended for application within construction storm water ditches and storm drains that feed into previously constructed sediment ponds or basins.

2. Anionic Polyacrylamide (PAM) is available in emulsions, powders, gel bars, and logs. It is required that other Best Management Practices be used in combination with anionic PAM. The use of seed and mulch for additional erosion protection beyond the life of anionic PAM is recommended. Use 50' setbacks when applying anionic PAM near natural water bodies. Never add water to PAM, add PAM slowly to water. If water is added to PAM, globs can form which can clog dispensers. This signifies incomplete

dissolving of PAM and therefore increases the risk of under application. Application rates shall conform to manufacturer's guidelines. **The maximum application rate of PAM, in pure form, shall not exceed 200pounds/acre/year.** Contractors using anionic PAM shall obtain and follow all Material Safety Data Sheet requirements and manufacturer's recommendations. Gel bars and logs of anionic PAM mixtures may be used in ditch systems. This application shall meet the same testing requirements as anionic PAM emulsions and powders. Maintenance will consist of reapplying anionic PAM to disturbed areas, including high traffic areas, which interfere in the performance of this practice.

3.6 MONITORING AND REPORTING

A. Each day, when any type of construction activity takes place on the construction site, Contractor's qualified personnel shall monitor and record rainfall, inspect all areas where petroleum products are stored, used or handled for spills and leaks from vehicles and equipment and check all locations where vehicles enter or exit the site for evidence of off site sediment tracking. These inspections shall be conducted until a Notice of Termination (NOT) is submitted. For linear construction where a phased activity is conducted, this paragraph applies to the active phase(s) of work.

B. Once every seven calendar days and within 24 hours of the end of a storm 0.5 inches or greater, Contractor's qualified personnel shall inspect disturbed areas of the construction site that have not undergone final stabilization, areas used for storage of materials that are exposed to precipitation that have not undergone final stabilization and structural control measures (BMPs). Erosion and sediment control measures identified in the Erosion, Sedimentation, and Pollution Control Plan shall be observed to ensure they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving water(s). These inspections must be conducted until a Notice of Termination is submitted. For linear construction where a phase activity is conducted, this paragraph applies to the active phase(s) of work.

C. Contractor's qualified personnel shall inspect a least once per month during the term of the General Permit, areas of the construction site having undergone final stabilization. These areas hall be inspected for evidence of, or the potential for, pollutants entering the drainage system and receiving water(s). Erosion and sediment control measure shall be observed to ensure they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measure are effective in preventing significant impacts to receiving water(s). For linear construction, monthly inspections in accordance with this paragraph shall be made for those phases on which final stabilization has been completed.

D. Contractor shall prepare a report summarizing the scope of inspections, name(s) of qualified personnel making the inspections, date(s) of inspections, major observations relating to the implementation of the Erosion, Sedimentation and Pollution Control Plan and any actions taken. This report shall be retained on the construction site or be readily available at a designated alternate location until the entire site or portion of a construction project that was phased, has undergone final stabilization and a Notice of Termination (NOT) is submitted to

EPD. Such reports shall identify any incidents of non–compliance. Where the report does not identify any incidents of non–compliance, the re report shall contain a certification that the facility is in compliance with the Erosion, Sedimentation and Pollution Control Plan and the General Permit. The report shall be signed in accordance with the General Permit.

3.7 SAMPLING AND ANALYSIS

A. Contractor must manually or automatically sample in accordance with the Comprehensive Monitoring Plan (CMP) at least once for each rainfall event described below. For a qualifying event, samples must be taken within forty–five (45) minutes of:

1. The accumulation of the minimum amount of rainfall, if the storm water discharge to a monitored receiving water or from a monitored outfall has begun at or prior to the accumulation.

2. The beginning of any storm water discharge to a monitored receiving water or from a monitored outfall, if the discharge begins after the accumulation of the minimum amount of rainfall.

However, where manual and automatic sampling are impossible (as defined in the permit), or are beyond the Contractor's control, the Contractor shall take samples as soon as possible, but in no case more than 12 hours after the beginning of the storm water discharge.

B. Sampling shall occur for the following events:

1. For each area of the site discharging to a receiving stream, the first rain event reaching or exceeding 0.5 inch and allows for monitoring during normal business hours* (Monday thru Friday, 8:00 a.m. to 5:00 p.m. and Saturday 8:00 a.m. to 5:00 p.m. when construction activity is being conducted by the Primary permittee) occurring after all clearing and grubbing operations are completed in the drainage area of the location selected as the sampling location;

2. In addition to (1) above, for each area of the site discharging to a receiving stream, the first rain event reaching or exceeding 0.5 inch and allows for monitoring during normal business hours* occurring either 90 days after the first sampling event or after all mass grading operations are completed in the drainage area of the location selected as the sampling location, whichever comes first.

3. At the time of the sampling performed pursuant to (1) and (2) above, if BMPs are found to be properly designed, installed, and maintained, no further action is required. If BMPs in any area of the site discharging to a receiving stream are not properly designed, installed, and maintained, corrective action shall be defined and implemented within two business days, and turbidity samples shall be taken from discharges of the same area for each subsequent rain event reaching or exceeding 0.5 inch during normal business hours* until the selected turbidity standard is

attained, or until post–storm event inspections determine BMPs are properly designed, installed, and maintained;

4. Existing construction activities, i.e., those occurring on or before the effective date of this permit, having met the sampling required by (1) above shall sample in accordance with (2). Those existing construction activities having met the sampling required by (2) above shall not be required to conduct additional sampling other than as required by (3) above.

   * Note the Permittee may choose to meet the requirements of (1) and (2) above by collecting turbidity samples from any rain event reaching or exceeding 0.5 inch and allows for monitoring at any time of the day or week.

5. For linear construction, if at any time during the life of the project, BMPs have not been properly designed, installed or maintained for the construction activities that discharge into a receiving water which is not being sampled, the Contractor shall sample that receiving water for the first rainfall event greater than or equal to 0.5 inches thereafter and for every rainfall event greater than or equal to 0.5 inches until BMPs are properly designed, installed and maintained.

C. Sampling shall be collected by "grab samples" and the analysis of these samples must be conducted in accordance with methodology and test procedures established in the General Permit. Sample containers shall be labeled prior to collecting the samples. Samples shall be well mixed before transferring to a secondary container. Large mouth, well cleaned and rinsed glass or plastic jars shall be used for collecting samples. The jars shall be cleaned thoroughly to avoid contamination. Manual or automatic sampling shall be utilized. Samples required by the General Permit shall be analyzed immediately, but in no case later than 48 hours after collection. However, samples from automatic samplers must be collected no later than the next business day after their accumulation, unless flow through automated analysis is utilized. Samples are not required to be cooled. Samples taken for the purpose of compliance with the General Permit shall be representative of the monitored activity and representative of the water quality of the receiving water(s) and/or the storm water outfalls using the following minimum guidelines:

   1. The upstream sample for each receiving water(s) must be taken immediately upstream of the confluence of the first storm water discharge from the permitted construction site but downstream of any other storm water discharges not associated with the site. Where appropriate, several upstream samples from across the receiving water(s) may need to be taken and the average turbidity of these samples used for an upstream turbidity value.

   2. The downstream sample for each receiving water(s) must be taken downstream of the confluence of the last storm water discharge from the construction site but upstream of any other storm water discharge not associated with the site. Where appropriate, several downstream samples

from across the receiving water(s) may need to be taken and the average turbidity of these samples used for a downstream turbidity value.

3. Samples shall be taken from the horizontal and vertical center of the receiving water(s) or the storm water outfall channel(s).

4. Care shall be taken to avoid stirring the bottom sediments in the receiving water(s) or in the outfall storm water channel(s).

5. Sampling container shall be held so the opening faces upstream.

6. Samples shall be kept from floating debris.

D. For all construction sites and common developments other than linear construction projects, the Contractor shall sample all receiving water(s), or all outfall(s) or a combination of receiving water(s) and outfall(s). For linear construction projects, the Contractor must sample all perennial and intermittent streams and other water bodies shown on an USGS topographic map and all other field verified perennial and intermittent streams and other water bodies, or all outfalls into such streams and other water bodies, or a combination thereof.

E. Contractor shall provide and implement all safety equipment and procedures necessary for sampling during hazardous weather conditions and in the event of biological, chemical or physical hazards

F. Contractor shall submit a summary of the monitoring results to the EPD at the address shown in the General Permit by the fifteenth day of the month following the reporting period. For a monitoring period during which no qualifying rainfall events occur, a monitoring report must be submitted stating such. Monitoring periods are calendar months beginning with the first month after the effective date of the General Permit. Monitoring reports shall be signed in accordance with the General Permit and submitted to EPD until such time as a NOT is submitted.

G. Contractor must retain copies of all monitoring results and monitoring information reported. In addition to other record keeping requirements, the monitoring information shall include:

1. Date, exact place, and time of sampling or measurements.

2. Name(s) of the individual(s) who performed the sampling and measurements.

3. Date(s) analyses were performed.

4. Time(s) analyses were initiated.

5. Name(s) of the individual(s) who performed the analyses.

6. References and written procedures, when available, for the analytical techniques or methods used. A quality control/quality assurance program must be included in the written procedures.

7. The results of such analyses, including the bench sheets, instrument readouts, computer disks or tapes, used to determine these results.

8. Results exceeding 1,000 NTU shall be reported as "Exceeds 1,000 NTU."

H. Suggested monitoring and report forms are found at the end of this section.

End of Section

INDEX TO

SECTION 31 31 16 – TERMITE CONTROL

SECTION 31 31 16

TERMITE CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following for termite control:

1. Soil treatment.

1.03 SUBMITTALS

A. Product Data: Treatments and application instructions, including EPA-Registered Label.

B. Product Certificates: Signed by manufacturers of termite control products certifying that treatments furnished comply with requirements.

C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

D. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following as applicable:

1. Date and time of application.

2. Moisture content of soil before application.

3. Brand name and manufacturer of termiticide.

4. Quantity of undiluted termiticide used.

5. Dilutions, methods, volumes, and rates of application used.

6. Areas of application.

7. Water source for application.

E. Test Results: Furnish written test results, performed by the State Department of Fertilizer and Pest Control, showing that treatment meets requirements of specifications.

F. Warranties: Special warranties specified in this Section.

1.04 QUALITY ASSURANCE

A. Applicator Qualifications: A PCO who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment in jurisdiction where Project is located and who is experienced and has completed termite control treatment similar to that indicated for this Project and whose work has a record of successful in-service performance. All termite pesticides shall be provided in strict accordance to South Carolina Pesticide Control Act [SC Law 46-13 and amendments] and Federal Regulations. The contractor shall notify Clemson University Pesticide Regulation and Controls program prior to beginning of treatment and application. Applicators shall also be certified in the U.S. Environmental Protection Agency (EPA) pesticide applicator category which includes structural pest control.

B. Regulatory Requirements: Formulate and apply termiticides, and label with a Federal registration number, to comply with EPA regulations and authorities having jurisdiction.

C. Standards for Application: Current edition of Georgia Division of Regulatory and Public Service Programs Standard 27-1085.

1.05 PROJECT CONDITIONS

A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with EPA-Registered Label requirements and requirements of authorities having jurisdiction.

B. Soil Moisture:

1. Soils to be treated shall be tested immediately before application. Soil moisture content shall be tested to a minimum depth of 3 inches. The soil moisture shall be as recommended by the termiticide manufacturer. The termiticide will not be applied when soil moisture exceeds manufacturer's recommendations because termiticides do not adhere to the soil particles in saturated soils.

1.06 COORDINATION

A. Coordinate soil treatment application with excavating, filling, and grading and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs, before construction.

1.07 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Written warranty, signed by applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

C. Warranty Period: Five years from date of Substantial Completion. Warranty shall be transferred to the Owner.

D. Monitoring and Continued Service: Monitoring and continued service with applicator shall be responsibility of the Owner after the first year from the date of submittal completion.

1.08 MAINTENANCE SERVICE

A. Continuing Service: Provide a proposal for continuing service, including monitoring, inspection and retreatment for occurrences of termite activity, from applicator to Owner, in the form of a standard yearly continuing service agreement, starting on the date of Substantial Completion. State services, obligations, conditions and terms for agreement period and for future renewal options.

1.9 SAFETY REQUIREMENTS

A. The Contractor shall formulate, treat, and dispose of termiticides and their containers in accordance with label directions and regulatory requirements. Use the clothing and personal protective equipment specified on the labeling for use during all phases of the application.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Delivery

1. Termiticide material shall be delivered to the site in the original unopened containers bearing legible labels indicating the EPA registration number and manufacturer's registered uses. All other materials to be used on site for the purpose of termite control shall be delivered in new or otherwise good condition as supplied by the manufacturer or formulator.

B. Storage

1. Materials shall be stored in designated areas and in accordance with manufacturer's labels. Termiticides and related materials shall be kept under lock and key when unattended.

C. Handling

1. Termiticides shall be handled in accordance with manufacturer's labels. Manufacturer's warnings and precautions shall be observed. Materials shall be handled preventing contamination by dirt, water, and organic material. Protect termiticides from sunlight as recommended by the manufacturer.

1.11 INSPECTION

A. Termiticides shall be inspected upon arrival at the job site for conformity to type and quality. Each label shall be inspected for conformance with specified requirements. Unacceptable materials shall be removed from the job site.

PART 2 – PRODUCTS

2.01 SOIL TREATMENT

A. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in a soluble or emulsible, concentrated formulation that dilutes with water or foaming agent, and formulated to prevent termite infestation. Use only soil treatment solutions that are not harmful to plants. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to the product's EPA-Registered Label.

1. Use compatible dye in termiticide solution to provide visible evidence of treatment.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. BASF Corporation, Agricultural Products; Termidor.

2. Bayer Environmental Science; Premise 75.

3. Control Solutions, Inc.; Bifen I/T.

4. FMC Corporation, Agricultural Products Group; Talstar.

5. Syngenta; Probuild TC.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of the soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control. Proceed with application only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparing substrate. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended by termiticide manufacturer.

C. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.03 APPLICATION, GENERAL

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.04 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute the treatment evenly.

1. Slabs-on-Grade: Underground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.

2. Foundations: Adjacent soil including soil along entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footers, piers, and chimney bases; and along entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.

3. Masonry: Treat voids.

4. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

D. Post warning signs in areas of application.

E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

3.05 VERIFICATION OF MEASUREMENT

A. Once termiticide application has been completed, tank contents shall be measured to determine the remaining volume. The total volume measurement of used contents for the application shall equal the established application rate for the project site conditions. The Contractor shall provide written verification of the measurements.

3.06 CLEAN UP, DISPOSAL, AND PROTECTION

A. Once application has been completed, the Contractor shall proceed with clean up and protection of the site without delay.

1. Clean Up

   a. The site shall be cleaned of all material associated with the treatment measures, according to label instructions, and as indicated. Excess and waste material shall be removed and disposed offsite.

2. Disposal of Termiticide

   a. The Contractor shall dispose of residual termiticides and containers off Owner property, and in accordance with label instructions and EPA criteria.

3. Protection of Treated Area

   a. Immediately after the application, the area shall be protected from other use by erecting barricades and providing signage as required or directed.

3.07 CONDITIONS FOR SATISFACTORY TREATMENT

A. Equipment Calibrations and Measurements

1. Where results from the equipment calibration and tank measurements tests are unsatisfactory, re-treatment will be required.

B. Testing

1. Should an analysis, performed by a third party, indicate that the samples of the applied termiticide contain less than the amount of active ingredient on the label, and/or if soils are treated to a depth less than specified or approved, re-treatment will be required.

C. Disturbance of Treated Soils

1. Soil and fill material disturbed after treatment shall be re-treated before placement of slabs or other covering structures.

D. Termites Found Within the Warranty Period

1. If live subterranean termite infestation or termite damage is discovered during the warranty period, the Contractor shall re-treat the site.

3.08 RE-TREATMENT

A. Where re-treatment is required, the Contractor shall:

1. Re-treat the soil and/or perform other treatment as necessary for prevention or elimination of subterranean termite infestation.

2. Repair damage caused by termite infestation.

END OF SECTION

INDEX TO

SECTION 31 62 13 – PRESTREESED CONCRETE PILES

SECTION 31 62 13

PRESTRESSED CONCRETE PILES

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Prestressed precast concrete piles.

1.2 RELATED SECTIONS

A. Section 310000 – Earthwork

B. Section 312313 – Subgrade Preparation

C. Section 033000 - Cast-In-Place Concrete

D. Section 316244 – Pile Load Test

1.3 REFERENCES (LATEST REVISION)

A. AASHTO M 203 – Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.

B. ACI 301 – Specifications for Structural Concrete.

C. ACI 543R – Recommendations for Design, Manufacture and Installation of Concrete Piles.

D. ASTM A 706 – Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.

E. PCI JR 382 – Recommended Practice for Design, Manufacture, and Installation of Prestressed Concrete Piling.

F. PCI MNL-116 – Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.

1.4 MEASUREMENT AND PAYMENT

A. Production Piles:

1. Base proposal on the number and length of piles indicated on construction drawings.

2. Accepted piles will be paid for at the contract price per unit length for the piles procured.

3. Contract pricing shall include a lump sum cost of the project which shall include the cost of piles. A unit price per length for piles shall also be included with the contract pricing and shall be used for pile length adjustments (if needed) or changes in pile quantities.

B. Payment for piles shall constitute full compensation for all costs of furnishing, driving, jetting, spudding, and cutting off of piles, disposing of cut-offs, furnishing, placing and removing temporary bracing required to hold piles in alignment, and other work necessary to complete the project as specified herein.

1.5 PERFORMANCE REQUIREMENTS

A. Drive piles under equipment/operations building to a depth capable of supporting an axial load of 60 tons. Pile lengths stated on the drawings are assumed to achieve the needed capacity. This is to be confirmed through results of pile testing. Test piles shall be 5 feet longer.

B. Drive piles under water treatment structure basins to a depth capable of supporting an axial load of 30 tons. Pile lengths stated on the drawings are assumed to achieve the needed capacity. This is to be confirmed through results of pile testing. Test piles shall be 5 feet longer.

C. Design piles to resist the following:

1. Piles under equipment / operations building: axial load of 60 tons and lateral load of 11 tons (factored loads).

2. Piles under water treatment structure basins: axial load of 30 tons and lateral load of 5 tons (factored loads).

D. If precast designer requires additional design information, precast designer shall contact engineer.

1.6 SUBMITTALS

A. Pile Installation Plan: At least 30 days prior to installation, Contractor shall submit a Pile Installation Plan to the Engineer for approval. Pile Installation Plan shall include the following:

1. List of proposed installation equipment including cranes, driving equipment, jetting equipment, compressors, hammers and pre-drilling equipment. Include manufacturer's data sheets with submittal.

2. Methods to determine hammer energy or stroke in the field for determination of pile capacity. Include the necessary charts and recent calibrations for any pressure measuring equipment and method for monitoring pile advancement.

3. Details of proposed load test equipment and procedures including recent calibrations of jacks and required load cells.

4. Shop drawings of piles indicating fabrication details, reinforcement, dimensions and pick points.

5. Drawings of templates and followers (if permitted).

6. Sequence of driving.

7. Methods and equipment proposed to prevent displacement of piles during placement and compaction of fill within 20 feet of piles.

B. Pile Load Test Reports: The results of which will determine the final pile length for procurement of the remaining production piles.

C. Record of Driving: Within three (3) days of installation, submit a complete report of each pile driven to include:

1. Sizes, lengths, locations, and batters (if any) of piles.

2. Make and type of hammer.

3. Driving energy of each hammer blow.

4. Number of blows per foot of penetration for entire length of pile and set for the last 10 blows.

5. Final tip and butt elevations.

6. Piles requiring drilling and the hole diameters.

1.7 QUALITY ASSURANCE

A. Concrete work shall conform to all requirements of ACI 301 and PCI MNL-116.

B. Manufacture and transportation of prestressed concrete piles shall be by a company having not less than three (3) years' experience in the manufacture of prestressed concrete structural components of equivalent type, size and complexity to those included herein. Upon Engineer's request, the manufacturer shall show successful completion documentation of similar and comparable work.

C. Plant organization and manufacturing procedures shall conform to PCI MNL-116 and plant shall be certified by the PCI Certification Program.

D. Plant Inspection:

1. Plants shall be subject to Engineer's, Owner's, or Owner's Representatives inspection to confirm compliance with the specifications.

2. The Engineer shall be given ample notice before the beginning of work so all of plant facilities involved in production can be inspected. No member shall be manufactured until all facilities are approved.

3. Engineer shall be allowed free access to all parts of the production process premises.

4. Engineer will have the authority to reject materials or workmanship that does not meet contract specifications.

5. Acceptance of any material or finished members by the Engineer shall not prevent them from being rejected later if they are found to be defective. Rejected material and workmanship shall be replaced promptly or made good at the Contractor's expense.

1.8 QUALIFICATIONS

A. Installer: Company specializing in performing the work of this section with minimum five (5) years' documented experience.

B. Design of piles, components and subsequent shop drawings shall be completed by and sealed by a professional engineer registered in the state of the project.

1.9 PRE-INSTALLATION CONFERENCE

A. Convene two (2) weeks prior to commencing pile driving activities.

1.10 SCHEDULING

A. Schedule work under the provisions of Section 01300.

B. Engineer shall be provided with pile installation schedule at the pre-installation conference. Changes to the pile installation schedule shall be submitted to the Engineer as soon as possible.

C. Schedule Work to perform driving during 8:00a.m. and 6:00p.m, unless other arrangements are made with the Owner.

D. Schedule test piles with all necessary parties, including owner, testing agency and engineer.

PART 2 – PRODUCTS

2.1 PILES

A. Piles shall be provided in accordance with the following: ACI 543R – Recommendations for Design, Manufacture and Installation of Concrete Piles, PCI JR 382 – Recommended Practice for Design, Manufacture, and Installation of Prestressed Concrete Piling and PCI MNL-116 – Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.

B. Piles shall be manufactured by a plant certified by the PCI Certification Program.

2.2 MATERIALS

A. Concrete: Minimum 5,000 psi 28-day strength, Normal Portland cement; aggregates and sand as recommended by pile manufacturer.

B. Tensioning Steel Tendons: AASHTO M 203, Grade 270k, of sufficient strength commensurate with member design.

C. Reinforcing Steel: ASTM A706 Grade 60.

2.3 FABRICATION

A. Pile Points: Hardened steel, hollowed tip to minimize bounce or deflection.

B. Pile Connectors: Fabricated of steel angles, fitted to square pile ends outside dimensions.

C. Shop fabricate pile in maximum practical lengths to meet design requirements.

2.4 SOURCE QUALITY CONTROL

A. Provide shop testing and inspection of piles under provisions of Section 01400.

B. Test sample piles in accordance with PCI MNL-116.

2.5 DRIVING EQUIPMENT

A. Hammers: Piling shall be driven with power hammers of approved make and model, steam or air hammers shall be furnished with boiler or air compressor capacity and hose sizes at least equal to those specified by the hammer manufacturer. The boiler or compressor shall be equipped with an accurate pressure gauge at all times. Power hammers shall be maintained in such condition so length of stroke and blows per minute are obtained as specified by the manufacturer. Driving resistance values computed when these requirements are not met will be considered invalid and driving operations shall cease until corrective measures are taken. Vibratory pile driving equipment shall not be used. Power hammers shall develop an energy per blow of at least one foot-pound for each pound of pile weight, but not less than 15,000 foot-pounds. Driving conditions may necessitate the use of hammers developing more energy than required minimum, but, for purpose of ascertaining required driving resistance, Contractor will not be required to furnish a hammer having more than a minimum manufacturer's energy rating of 22,400 foot-pounds.

B. Leads: Pile driving rigs shall be equipped with leads constructed in a manner to afford freedom of movement for the hammer and to provide adequate pile support during driving. Vertical axis of leads and hammer shall coincide with the vertical axis of the pile. Leads shall be of sufficient length and rigidity to hold the pile in accurate alignment while being driven. However, the driving rig shall be capable of making minor adjustments in positioning leads, to compensate for minor changes in direction while driving.

C. Followers: The driving of piling by means of followers must be approved by the Engineer prior to implementation.

PART 3 – EXECUTION

3.1 PREPARATION

A. It shall be the Contractor's responsibility to verify site conditions will support proposed driving equipment.

B. Contractor shall use a driving method at all times, which will not cause damage to nearby structures. No piles shall be driven within 20 feet of concrete less than seven (7) days old unless so directed by the Engineer.

C. Notify adjacent and affected land owners and building occupants with 30 days notice before proceeding with the work.

D. Do not ship piles prior to the completion of a 72-hour (min) curing period and attainment of the required 28-day strength.

3.2 PROTECTION OF PILES DURING DRIVING

A. A structural steel driving head/helmet suitable for the type and size of pile being driven shall be used. It shall adequately hold the pile in proper positioning for driving. It shall be constructed to prevent undue damage to the pile and transmit hammer energy along pile axis. Suitable hammer cushion shall be used above driving head / helmet as necessary to prevent damage to the pile. Do not use wood chips, wood blocks, rope or other material which permits excessive loss of hammer energy. Driving head / helmet shall fit loosely around pile head, enabling pile to rotate slightly without binding.

B. A suitable pile cushion shall also be provided for the top of the pile. It shall be made of a material which will not compress to such an extent the cushioning effect is lost. Pile cushion shall be replaced if, through pile driving, it is compressed to more than one-half original thickness.

3.3 PILE DRIVING

A. Extreme care shall be exercised in the locating and driving of piles so that no other piles, utilities or existing structures are damaged in the process.

B. Plan Driving Objective (PDO): Driving of all piles shall be continuous without interruption until the PDO is obtained. The PDO has these minimum requirements to be obtained during pile driving:

1. The minimum driven length of piles shall be as indicated on the drawings. Test piles shall be 5 feet longer than that specified.

2. The Driving Resistance per pile shall be as stated in this Specification, Section 1.5, Performance Requirements.

C. Drive piles at any time after the concrete has been cured in accordance with PCI MNL-116 and the concrete compressive strength is equal to or greater than the specified 28-day strength.

D. Templates shall be required for all pile driving systems except where fixed leads are utilized.

E. Removal of Obstacles: Unless otherwise permitted, underground obstructions that prevent attainment of the PDO shall be removed or cut-out. Removal or cutting will

be measured and paid for at a price mutually agreed upon by the Owner and Contractor.

F. Practical Refusal: 2.5 times the design bearing capacity with a minimum penetration of 40'-0" below existing grade. When point of refusal is reached during pile driving before attaining PDO, care shall be taken to avoid damaging the pile by overdriving.

G. Jetting: Jetting shall not be used on this project.

H. Drilling / Augering: If conditions warrant the need for pre-drilling or augering prior to driving piles, Contractor shall submit a request with explanation to Engineer for approval.

I. Protection: Piling shall not be subjected to excessive tensile stresses due to the combination of a particular hammer with the given soil conditions, such as may occur when driving a long pile through soft material or when hard driving resistance is encountered at the tip of a long pile. When such damage occurs, the Contractor shall make such changes as necessary to provide undamaged piling in place. If such damage occurs, the Engineer may require:

1. Reduced energy delivered to the pile. This may be reduced stroke, change in cushioning, or a lighter ram.

2. Equivalent energy, but with a heavier or lighter ram with a different stroke.

3. Smaller hammer for the easier initial driving.

4. Jetting may be considered.

J. Delay: When driving is interrupted before final penetration is reached, drive an additional 12 inches before resuming recording or performance data.

K. Back-Driving: In the event uplift of a previously driven pile occurs due to driving of adjacent piles or soil uplift, the pile shall be back-driven to its original penetration.

L. Followers may be used upon approval of the Engineer. Cross sectional area of the follower must be at least 18% of the cross-sectional area of the pile. Followers must maintain the alignment of the pile and hammer and must allow the pile to be driven within allowable tolerances.

3.4 TOLERANCES

A. Maximum Variation from Vertical for Plumb Lines: 1 in 48.

B. Maximum Variation from Required Angle for Batter Piles: 1 in 24.

C. Maximum Variation from Pile Cut-Off Elevation: 4 inches, provided specified embedment in pile cap is achieved.

D. Maximum Out-of-Position: 3 inches for any one pile. The sum of any two piles shall not exceed 5 inches.

E. Pile butts shall not be pulled into required location more than 2 inches.

3.5 LOAD CAPACITY

A. Approximate load capacity of all piles shall be determined by evaluation of driving resistance, regardless of the PDO requirements. Driving resistance will be determined by the following formulas:

For Single-Acting Hammers: $DR = \frac{2\,WH}{S + 0.1}$

For Double-Acting Hammers: $DR = \frac{2\,(W + AP)H}{S + 0.1}$

Where:

DR = Driving resistance in tons

W = Weight of striking part of hammer in tons

H = Height of fall in feet, 10-feet maximum.

A = Area of piston in square inches

P = Pressure at the hammer in tons per square inch

S = Average penetration in inches per blow for the last 10 to 20 blows

Above formulas are applicable only when hammer has a free fall, head of the pile is not cracked or crushed, penetration is at a uniform rate, and a follower is not used.

3.6 CUTOFFS, SPLICES, AND EXTENSIONS

A. All piling shall be driven to or cut off at the required elevation at a right angle to the axis of the pile. Piling driven below this elevation shall be spliced and extended in accordance with SCDOT standard details.

B. Concrete at the end of pile to be extended shall be cut back a required amount leaving pre-stressed strand exposed. Final cut shall be at right angle to the pile axis. Cutting shall be performed in a manner to avoid spalling or damaging the pile below cut-off elevation. In case of such damage, the pile shall be replaced or damage remedied by further cut back as determined by the Engineer at Contractor's expense. Cutting may be performed with pneumatic tools, saws, or other approved methods. In no case shall explosives be used.

C. Formwork necessary for the extension shall be built, placed, and braced with special care to obtain true alignment and to prevent leakage at the construction joint.

D. Just prior to placing new concrete, the cut area shall be thoroughly wetted and then covered with a thin coating of cement paste.

E. Extensions are not permitted for this project.

3.7 NON-CONFORMING PILES

A. Non-conforming piles are any piles that fail to meet material certification, are driven out of position, are driven below the specified cut-off elevation, or are damaged by reason of internal defects or by improper driving.

B. Non-conforming piles shall be corrected at Contractor's expense by one or more of the following methods, as directed by the Engineer:

1. Extract the pile and replace it with a new pile.

2. Drive a new pile adjacent to the defective pile.

3. Extend footing or cap concrete to embed the pile properly, and make required changes to bar reinforcement steel.

4. Delay the work pending a design analysis. Corrections specified by the Engineer shall be made. Delay will be considered as incidental to the work.

C. Cracks that develop in a pile which do not warrant classifying the pile as defective shall be sealed with an approved epoxy crack sealer placed as directed, at no cost to the Owner. The Engineer will be solely responsible for determining if a pile shall be classified as defective.

3.8 FIELD QUALITY CONTROL

A. Field observation will be performed under provisions of Section 014500, Quality Control.

B. At the Owner's expense, the Special Inspector shall inspect piles prior to installation, conduct all pile testing, and maintain records of blow counts throughout installations. Contractor is responsible for scheduling testing agency for Special Inspection services.

C. Contractor shall be responsible for payment to testing agency if it is the Contractor's fault that Special Inspection services are requested and not needed. Some examples of this are schedule mishaps, equipment malfunction, subcontractor failure to perform, etc. This does not include delays or cancellations due to acts of God or inclement weather.

D. Test piles shall be production piles.

END OF SECTION

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SECTION 31 62 44 – PILE LOAD TEST

SECTION 316244

PILE LOAD TESTS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Pile load testing with documented results.

1.2 RELATED SECTIONS

A. Section 316213 – Concrete Piles.

1.3 REFERENCES (LATEST REVISION)

A. ASTM D 4945 – Standard Test Method for High–Strain Dynamic Testing of Deep Foundations.

1.4 MEASUREMENT AND PAYMENT

A. Test Piles:

1. Accepted test piles required by the plans shall be included in the lump sum price of the project. Payment includes set–up, applying test load, test equipment, monitoring, and reporting results.

2. It is intended that test piles will be production piles.

B. The cost of testing of piles shall be borne by the Owner, included in the scope of services for the special inspector. Owner is not responsible for any additional costs incurred as a result of Contractor's mistakes or unpreparedness for testing procedures.

1.5 SUBMITTALS

A. Equipment and Test Data: Indicate test method and equipment, load type, and calibration equipment.

B. Dynamic Pile Test Report: Following completion, submit to Engineer.

1.6 QUALITY ASSURANCE

A. Perform work in accordance with ASTM D 4945.

B. Maintain one (1) copy of document on site during testing.

1.7 QUALIFICATIONS

A. Monitor test pile placement and elevations under direct supervision of a Registered Land Surveyor experienced in design of this work and licensed in the state where the project is located.

B. Testing shall be performed by the agency performing special inspections.

1.8 SEQUENCING

A. Sequence work to allow other excavations and site work during testing.

PART 2 – PRODUCTS

2.1 EQUIPMENT

A. Equipment Type, Load Carrying Device, Load, and Instrumentation: Conform to ASTM D 4945 and use same type as will be used for installation of all other piles.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify site conditions will support loads and equipment necessary for testing purposes. Submit documents to support verification.

3.2 PREPARATION

A. Establish stable working elevation for test equipment.

3.3 TESTING

A. Following installation of test piles, allow test piles to sit idle for 7 days for set–up. Following set–up, perform Dynamic Load Testing using a Pile Dynamic Analyzer (PDA).

B. Load test the following:

1. WWTP Basins/Building: Test (2) piles prior to installation of production piles. It is assumed that test piles will also be production piles and should be located at opposite ends of the building/basin structure. Contractor may propose location to Engineer for approval.

   Test (4) additional piles throughout duration of installation to ensure consistency and confirm results.

C. Load test results should confirm a minimum of two times the design service load of the pile. If tested piles do not conform to requirements, static load test or testing of additional piles may be required.

D. Test results shall be provided to the Engineer within three (3) business days of completion of the testing.

3.4 FIELD QUALITY CONTROL

A. Field observation and monitoring of testing will be performed by special inspector and Engineer.

B. Document test equipment used, method of calibration and recording, test results, and recommendations or modification of piling method used.

C. Accurately record actual dimensions and locations of tested piles and movement or distortion caused by testing.

3.5 EQUIPMENT REMOVAL

A. Remove test equipment from site following completion of test procedures.

END OF SECTION

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AGGREGATE BASE COURSE